A Mental Health Survey of Introductory STEM Students

Written by Morgan Rondinelli

Advised by Dr. Meghan Duffy

July 2018

A thesis submitted in partial fulfillment of the Degree of Bachelor of Science in Ecology, Evolution, and Biodiversity with Honors

Table of Contents

For Mom and Melissa who have supported me in every way;

For Epi, Amy, and Gen, the fiercest friends I've ever known;

And in memory of Claire

Abstract

We conducted a mental health survey of introductory biology and physics students at University of Michigan. The survey was distributed via ECoach and administered using Qualtrics, and included the Patient Health Questionnaire (PHQ-8) and Generalized Anxiety Disorder (GAD-7) screening tools. It also included questions on previous diagnoses, stress mindset, resource usage and knowledge, barriers to seeking help, and demographic information. 61 students fully completed the survey (5.0%). 23% of respondents reported a previous diagnosis of a depressive disorder and 25% of respondents reported a previous diagnosis of an anxiety disorder. Identifying as a first-generation student and part of the LGBTQ+ community were associated with higher risk of poor mental health. 85% of respondents were aware of Counseling and Psychological Services (CAPS), the main on-campus resource for mental health, and respondents generally felt confident about their knowledge of resources, regardless of need. Notable barriers to seeking help included fear of disclosing affecting fellow student and faculty/staff opinion, long wait times, and lack of motivation. Perceived stigma was also identified as a barrier, though the majority of students reported they would not think less of a person who has received mental health treatment. An important next step would be to increase the sample size of future iterations of this survey to assess the generality of the results.

1. Introduction

"One in four" is a popular statistic used by mental health organizations to represent the number of individuals globally who will experience a mental illness in their lifetime (World Health Organization 2001). This surprisingly large number is often used in campaigns to destigmatize mental health. For example, it is frequently used by organizations on college campuses, such as the national organization Active Minds, to promote attending to student mental health.

Previous research has estimated that 15.6% of undergraduates and 13% of graduate students screened positive for a depressive or anxiety disorder (Eisenberg et al. 2007). Even more alarming, 2.5% of undergraduates and 1.6% of graduate students reported suicidal thoughts in last four weeks (Eisenberg et al. 2007). If there are approximately 500 students in introductory biology at University of Michigan in a given semester, those numbers indicate about 78 of these students would screen positive for anxiety and/or depression and about 13 would report suicidal thoughts in the last four weeks. These numbers show that mental health problems are prevalent on college campuses and we should be concerned about student mental health.

Moreover, some students are at greater risk for mental health problems. Several socioeconomic characteristics have been previously identified as associated with greater risk of poor mental health. These include identifying as female, "other" race, bisexual, living with parents/guardians, financial struggles or a well-to-do upbringing (Eisenberg et al. 2007), relationship stressors, low social support, and/or being a victim of sexual violence (Hunt and Eisenberg 2010). Similarly, there is likely an idea amongst students that science, technology, engineering, and math (STEM) students face extra pressures as well. All students need access to

mental health resources, but it is especially important to ensure that students at greater risk are knowledgeable about and have access to these resources.

Unfortunately, barriers can stand in the way of seeking help. Previous research has found barriers to help-seeking include lack of time, lack of perceived need for help, wanting to deal with issues on their own, being unaware of services or insurance coverage, and skepticism about treatment effectiveness (Hunt and Eisenberg 2010; Lipson et al. 2017). Even if help is available, if there are significant barriers in the way, those resources may go unused.

We were interested in the mental health of students in large introductory STEM courses, as well as their knowledge and use of available mental health resources. Therefore, we surveyed introductory biology and physics students at University Michigan to assess mental health (based on responses to anxiety and depression screening surveys as well as previous diagnoses) and to study demographic factors associated with a greater risk of poor mental health. We also studied students' stress mindset (that is, perceptions of the effects of stress), campus-specific resource knowledge and usage, current and past barriers to seeking help, and perceptions of stigma surrounding mental health.

2. Methods

We administered a survey to students at the University of Michigan (IRB: HUM00136645.) The survey opened on March 12, 2018 and was kept open for two weeks until March 26, 2018. Our survey was shared with all students enrolled in Biology 171 (Introductory Biology: Ecology and Evolution) and/or Physics 140 (General Physics I). 1226 students received the survey (580 Biology 171, 653 Physics 140, 7 enrolled in both classes). We chose these two classes because they are large, introductory STEM classes that make use of the learning software ECoach. ECoach

is an educational software that provides students personalized coaching for studying and succeeding in a class. All students enrolled in these classes received an email via ECoach inviting them to take the survey. The link took them to a consent form with the option of clicking continue to consent to taking the survey or discontinuing.

The survey was administered using the software Qualtrics. Questions were inputted as either matrix tables, multiple choice with single answer, or multiple choice with multiple answers possible. All questions were optional, allowing participants to skip a question if they felt uncomfortable answering due to the personal nature of the questions. There were a total of fifty-nine questions. Questions asked about: positive mental health and behaviors, the Patient Health Questionnaire (PHQ-8) depression screening (which is the PHQ-9 without the question about suicidal ideation), the Generalized Anxiety Disorder (GAD-7) anxiety screening, previous mental health diagnoses, knowledge of campus services, perceived need for help, help-seeking intentions, use of counseling services, informal help seeking, knowledge and use of University of Michigan specific resources, past and current barriers to seeking help, perceptions of stigma, perceptions of the campus climate's impact on mental health, mindset about the effects of stress, and achievement goals and their impact. We removed the question about suicidal ideation from the PHQ-9 and used the PHQ-8 instead because of the sensitive nature and the lack of ability to follow up with students who reported suicidal ideation. National and on-campus mental health resources were given at the end of the survey to all participants. The survey also asked several demographic questions including: gender, race/ethnicity, family income, first-generation college student status, member of Honors, member of Comprehensive Studies Program, in-state vs. out-of-state vs. international status, high school GPA, college GPA, varsity athlete status, use of exam playbook in ECoach, and member of the LGTBQ+ community. (See Appendix for full survey).

3

First, our goal was to get a general picture of the range of demographics we received in our responses. For each demographic question, we calculated the percentages of students who indicated each response, or for the quantitative variables (high school and college GPA) we calculated mean and standard deviation values (Table 1).

We also tallied each individual's depression (PHQ-8) and anxiety (GAD-7) screening total scores and categorized them as "none" – "severe" depression and/or anxiety using standard cut-off values. We calculated the percentages of surveyed students falling into each classification (Tables 2 and 3).

We used t-tests to assess risk factors for screening positive for depression and/or anxiety, looking for differences in depression and anxiety scores between demographic groups (gender, race, first-generation status, residency status, use of ECoach, and LGBTQ+ identity). We were unable to test for differences based on honors status and varsity athlete status because of limited data. We also tested whether there was a significant relationship between college GPA and depression and anxiety scores.

To score the stress mindset questions (#40-43 on our survey), we ascribed numbers to the Likert scale replacing "strongly disagree" – "strongly agree" with 1 – 6 for questions 40 and 42. We replaced the Likert scale with the reverse 6 – 1 for questions 41 and 43 since these questions were asked in the opposite direction. We tallied each student's total stress mindset score and looked for correlations between stress mindset scores with both depression and anxiety scores.

Furthermore, we looked at knowledge and usage of on-campus mental health resources. To do this, we tallied the number of students who selected each service and then calculated the percentage who indicated knowledge/use of the service. Next, we assessed if perceived need for mental health services matched up with actual need according to the screening survey. To do

this, we grouped students based on whether they screened positive for depression and/or anxiety (scoring greater than 9 on either test) and looked for differences in their responses to the statements "In the past 12 months, I needed help for emotional or mental health problems" and "If I needed to seek professional help for my mental or emotional health, I would know where to go on my campus."

Our next questions revolved around past and current barriers to seeking treatment. To assess this, we tallied the number of students who selected each barrier option as a past or current barrier. We then calculated the percentages of surveyed students who selected each barrier.

We were particularly interested in if stigma was a barrier. To look at this, we focused on responses to the questions "Most people think less of a person who has received mental health treatment" and "I would think less of a person who has received mental health treatment." Specifically, we compared agreement or disagreement to these statements for stigma related to "other" or "self" and also analyzed each individual's paired responses to the two questions about stigma using a paired sign test (Robertson et al. 1995). Analyses were done in R (version 1.1.383).

3. Results

We received a total of n=98 responses across both Biology 171 and Physics 140. Only complete responses (n=61, 5.0%) were used. See Table 1 for demographic distributions.

3a. Prevalence Data

Based on responses to the PHQ-8 depression screening, only 20% of respondents screened negative as experiencing no depression. Approximately 49% of respondents screened positive for at least moderate depression. 21% of respondents screened positive for moderately severe or severe depression (Table 2, Figure 1). Using the students' self-reported previous diagnoses, approximately 23% of respondent reported a previous diagnosis of a depressive disorder (e.g., major depressive disorder, bipolar/manic depression, dysthymia, persistent depressive disorder).

For the GAD-7 anxiety screening, approximately 34% of respondents screened positive as likely having generalized anxiety disorder (GAD) by scoring 10 or greater (Table 3, Figure 1). Approximately 25% of respondents reported a previous diagnosis of an anxiety disorder (e.g., generalized anxiety disorder, phobias, obsessive-compulsive disorder, post-traumatic stress disorder).

Table 1
Demographic profile of respondents (n=61).
Percentages may add to >100% because multiple answers allowed or because of rounding

| Demographic	n (%)	Mean (SD)
Gender		
Female	45 (74%)	
Male	15 (25%)	
Non-binary	1 (2%)	
Prefer not to say	0 (0%)	
Race/ethnicity		
(multiple answers allowed)		
African American/black	1 (2%)	
Asian or Asian American	6 (10%)	
Hispanic/Latinx	5 (8%)	
Middle Eastern/North African	3 (5%)	
White	49 (80%)	
More than one race/ethnicity	8 (13%)	
Other	0 (0%)	
Family income		
<$40,000	8 (13%)	
$40-65,000	6 (10%)	
$65,000-90,000	8 (13%)	
$90,000-120,000	11 (18%)	
$120,000-160,000	6 (10%)	
$160,000-200,000	12 (20%)	
>$200,000	10 (16%)	
First-generation college student		
Yes	12 (20%)	
No	48 (79%)	
I'm not sure	1 (2%)	
Honors Program		
Yes	4 (7%)	
No	57 (93%)	
I'm not sure	0 (0%)	
Residency		
In-state	45 (74%)	
Out-of-state	14 (23%)	
International	2 (3%)	
GPA		
High school GPA		3.99 (0.32)
(higher than 4.0 possible)		
Current college GPA		3.31 (0.54)
Varsity athlete at Michigan		
Yes	1 (2%)	
No	60 (98%)	
Used exam playbook in ECoach		
Yes	49 (80%)	
No	12 (20%)	
I'm not sure	0 (0%)	
Member of LGBTQ+ Community		
Yes	22 (36%)	
No	39 (64%)	
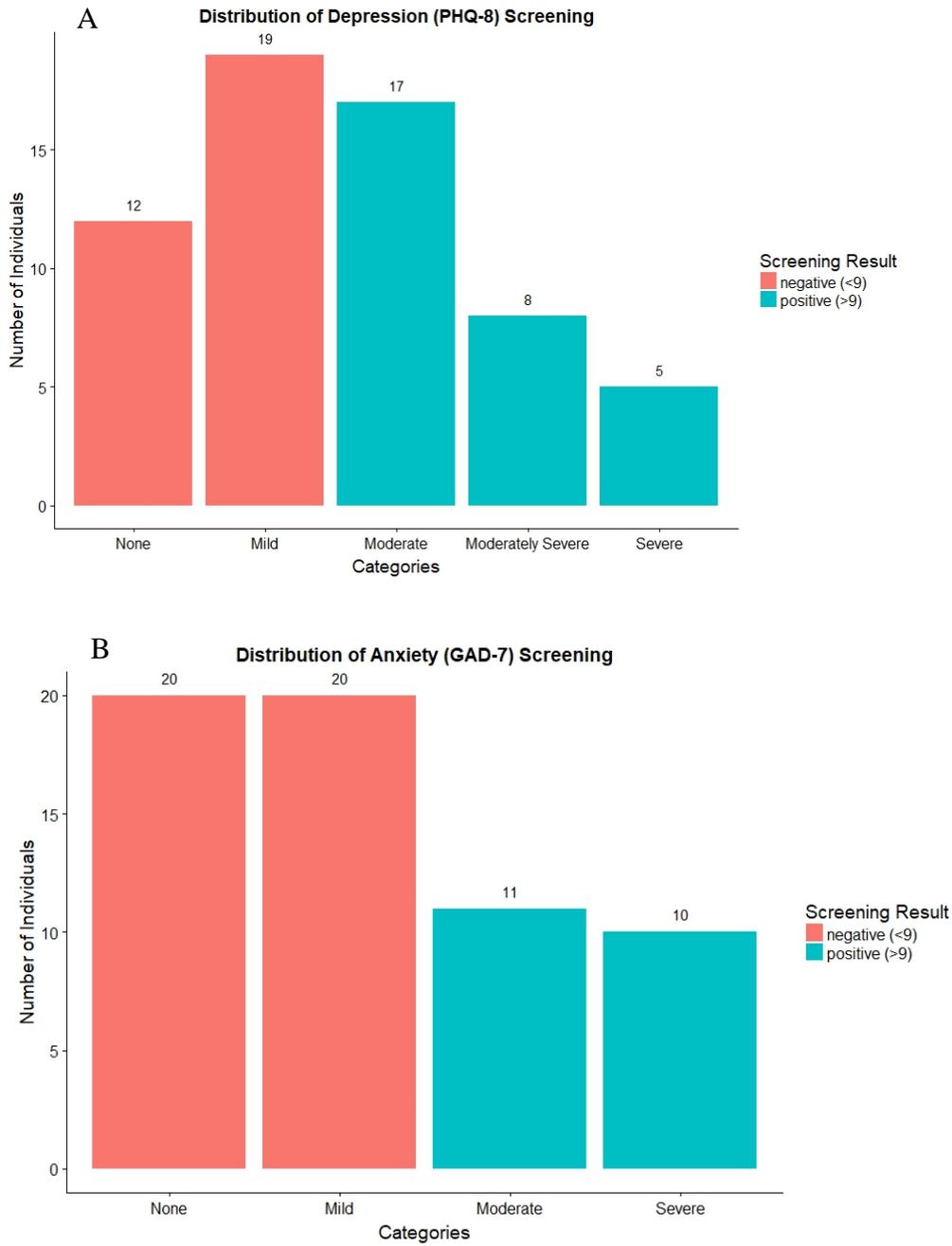
Figure 1

Distribution of Depression (PHQ-8) (A) and Anxiety (GAD-7) (B) Screening

Table 2

Depression Screening (PHQ-8) Scoring Distribution

Category	Scores	Counts	Percentages
None	0-4	12	20%
Mild	5-9	19	31%
Moderate	10-14	17	28%
Moderately Severe	15-19	8	13%
Severe	20-24	5	8%

Table 3

Anxiety Screening (GAD-7) Scoring Distribution

Category	Scores	Counts	Percentages
None	0-4	20	33%
Mild	5-9	20	33%
Moderate	10-14	11	18%
Severe	15-21	10	16%

3b. Risk Factors

Students who had high scores on the PHQ-8 depression screening were more likely to have high scores on the GAD-7 anxiety screening (Figure 2, $r=0.75$, $p=5.6 \times 10^{-12}$).

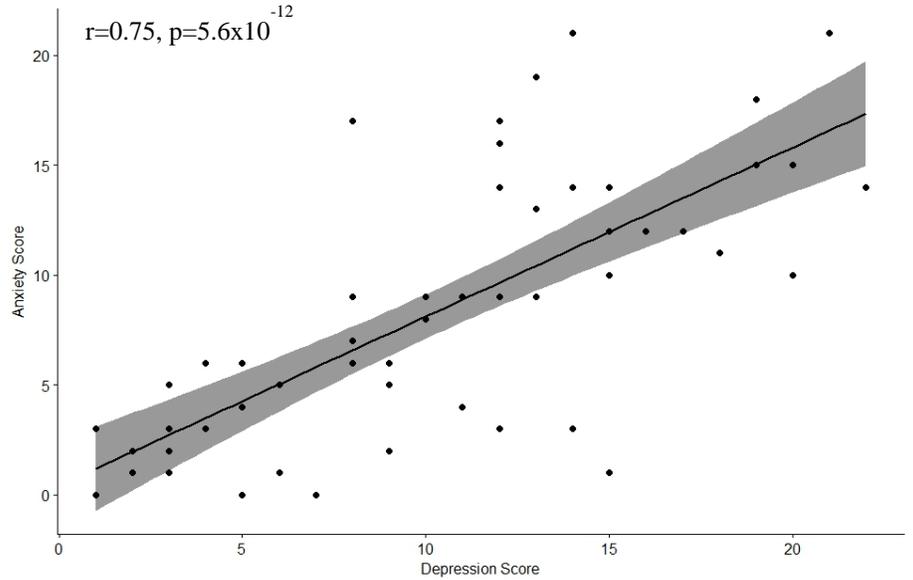Of all the demographic characteristics, the ones that were

$r=0.75$, $p=5.6 \times 10^{-12}$

Figure 2
Depression Scores vs. Anxiety Scores

A **Depression Scores by First Generation Status**
$t=-2.2026$, $p=0.04305$

B **Anxiety Scores by First Generation Status**
$t=-2.7934$, $p=0.01233$

C **Depression Scores by LGBTQ+ Identity**
$t=-4.4394$, $p=6.099 \times 10^{-5}$

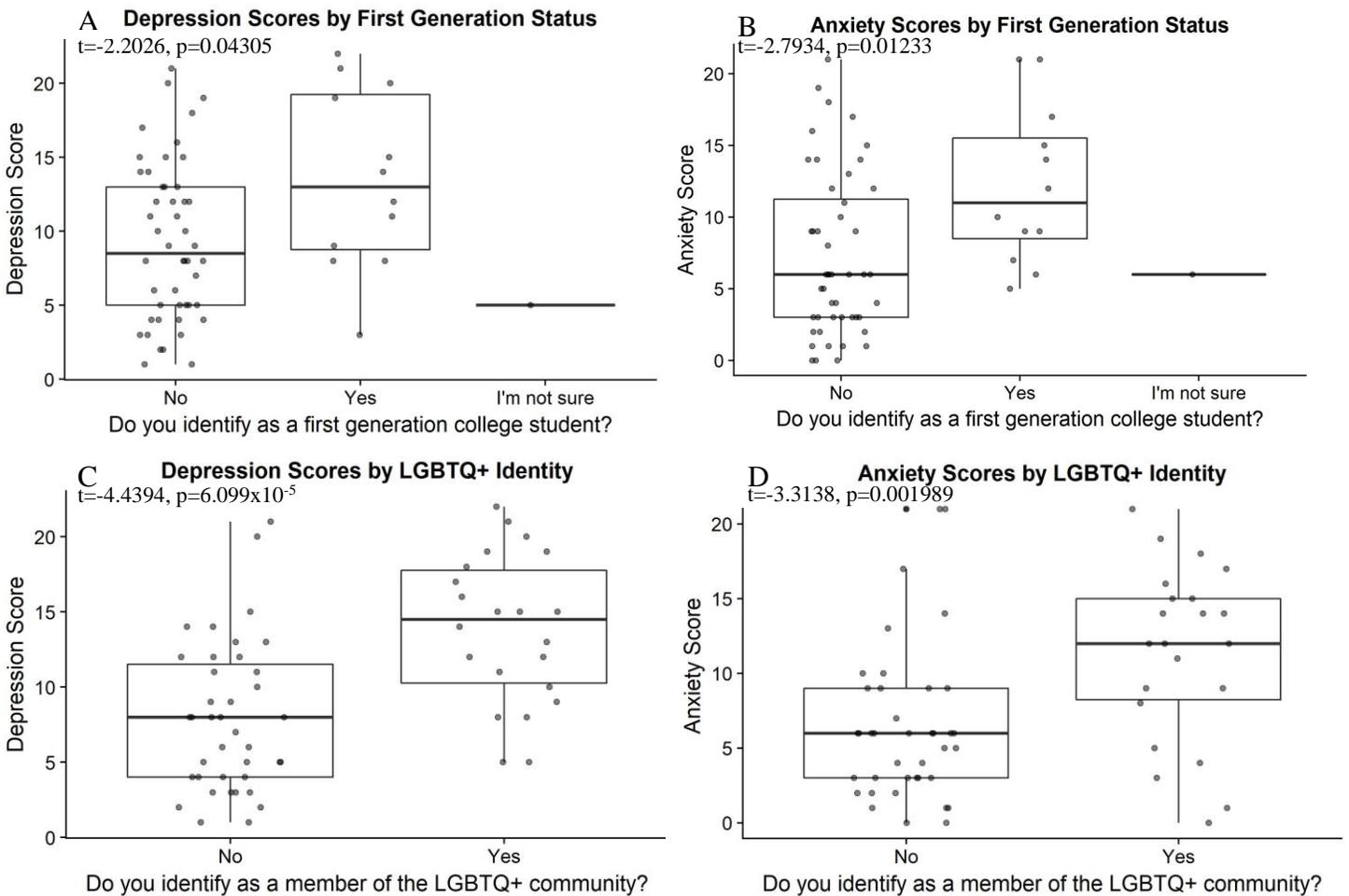D **Anxiety Scores by LGBTQ+ Identity**
$t=-3.3138$, $p=0.001989$

Figure 3
Demographics vs. screening tests box plots

8

significantly associated with higher depression and anxiety scores were identifying as a first generation student and identifying as a member of the LGBTQ+ community (Figure 3; Table 4).

3c. Stress Mindset

The distribution of stress mindset scores followed a relatively normal distribution. Scores could range from a minimum of 4 and a maximum of 24. The mean score was approximately 16.5 and the median score was 16.

Higher anxiety scores were not correlated stress mindset scores (r=0.11, p=0.39). The same was true with depression scores (r=0.058, p=0.66) (Figure 4).
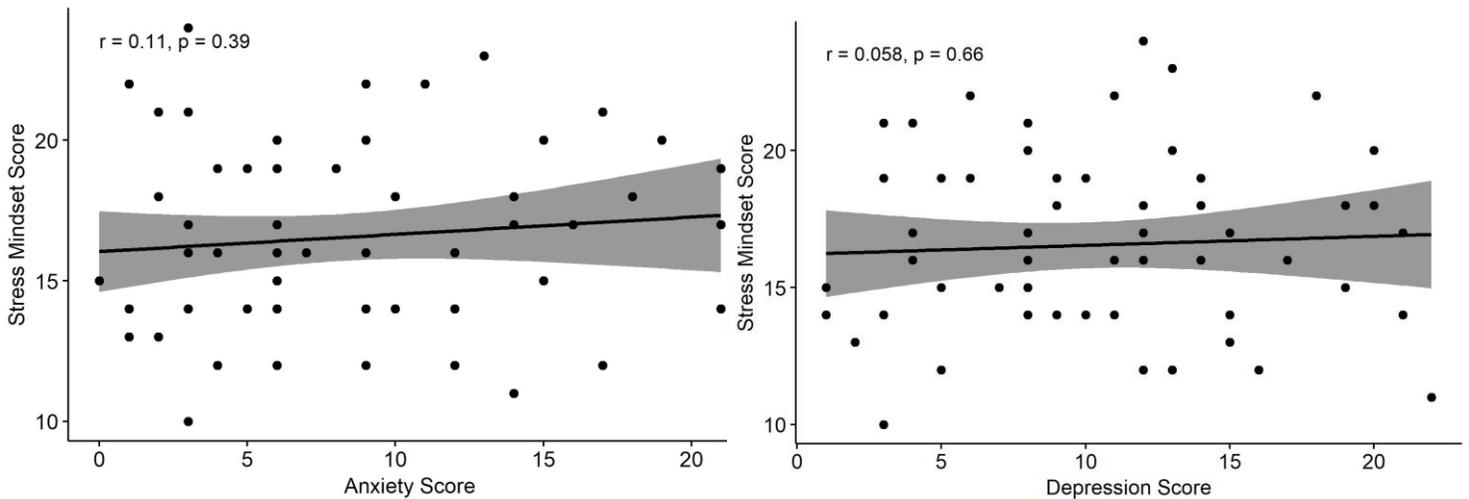

Figure 4
Stress mindset scores vs. anxiety and depression scores

## 3d. Resource Knowledge and Usage

The resources students were most aware of were CAPS (main office) and UHS at 85.2% and 80.3%, respectively. These were also the most used resources at 26.2% for CAPS and 16.4% for UHS. However, more than half (57.4%) of students have not used any mental health services at UM (Table 5).

Table 4
Demographics vs. Screening Tests t-test p-values
*(Green indicates significant p-values.)*

	PHQ-8 Depression Screening	GAD-7 Anxiety Screening
Gender (male vs. female)	0.2674	0.2982
Race/ethnicity (white vs. non-white)	0.2464	0.4867
First-generation status (w/o I'm not sure)	0.04305	0.01233
State residency status (w/o international)	0.5691	0.858
ECoach usage	0.2187	0.6688
LGBTQ+ identity	0.00006099	0.001989
College GPA	0.22	0.5

Table 5
Percentage of surveyed students aware of and who have used each on-campus service/resource

On-campus mental health service/resource	Aware of Service	Have Used Service
Counseling and Psychological Services (CAPS) in the Union/Main Office	85.2%	26.2%
Counseling and Psychological Services (CAPS)-Embedded Model – a caps counselor within my school	14.8%	1.6%
University Health Service (UHS)	80.3%	16.4%
UM Psychological Clinic	3.3%	0%
Department of Psychiatry off Outpatient Clinics (Depression Center, Anxiety Disorders Clinic, etc.)	3.3%	0%
Psychiatric Emergency Services (PES)	6.6%	0%
Mental health student organizations (Active Minds, Wolverine Support Network, etc.)	23.0%	1.6%
Not aware of any/have not utilized any mental health services at UM	4.9%	57.4%
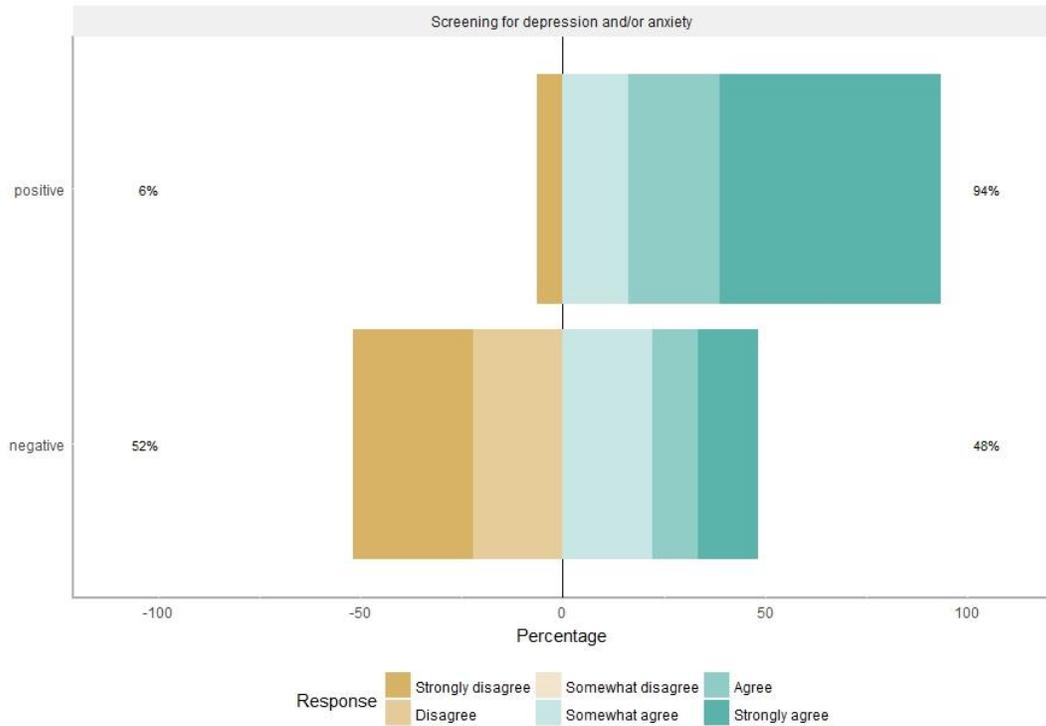
Figure 5
Screening tests vs. agreement with "In the past 12 months, I needed help for emotional or mental health problems."
Percentages on the left and right represent the percentages of students who fell on either the agree or disagree sides of the spectrum.
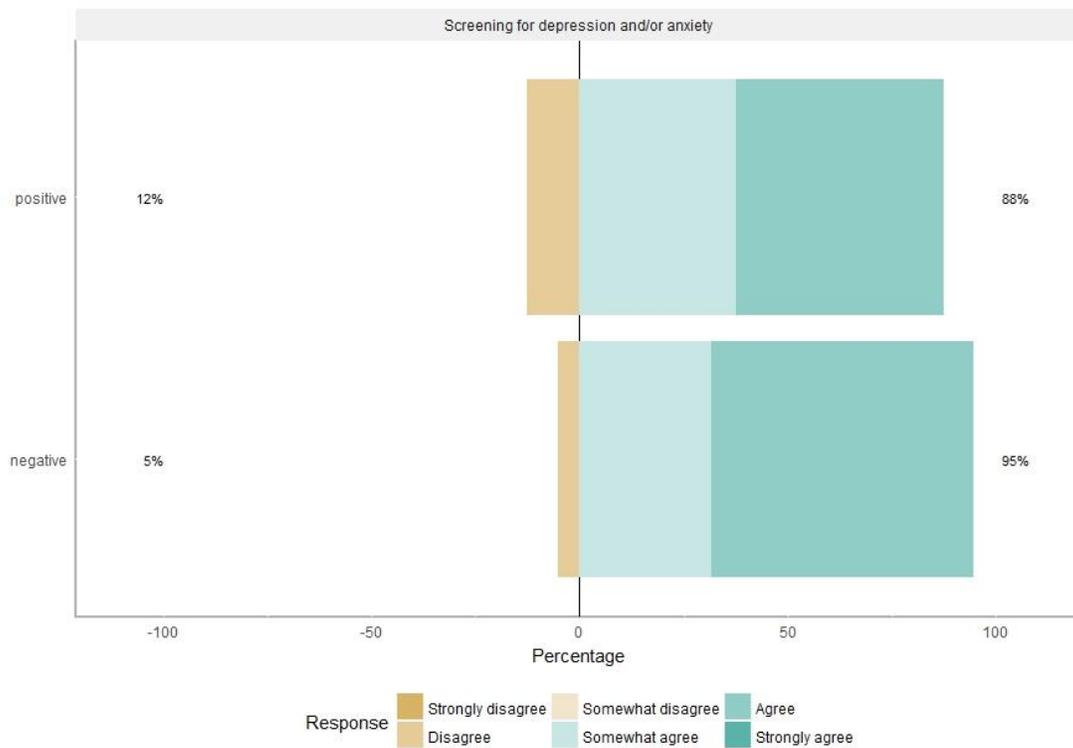
Figure 6
Screening tests vs. agreement with "If I needed to seek professional help for my mental or emotional health, I would know where to go on my campus."
Percentages on the left and right represent the percentages of students who fell on either the agree or disagree sides of the spectrum.

11

There was a relationship between screening results for depression and/or anxiety and personally perceiving a need for help. Students who screened positive for anxiety and/or depression generally did perceive that they needed help in the past twelve months (Figure 5).

There was not a relationship between screening results for depression and/or anxiety with knowledge of where to go to for help on campus. Most students are aware of on-campus mental health resources regardless of screening results (Figure 6).

3e. Barriers to Seeking Treatment and Perceptions of Stigma

The most common barrier to seeking treatment was fear of how disclosing would affect student and faculty/staff perceptions at 37.7% of surveyed students identifying it as a past barrier and 32.8% of surveyed students identifying it as a current barrier. The second and third most common barriers were long wait times and hours of service not fitting into their schedule (Table 6). Four students wrote in in the free response section that a lack of motivation to seek help, usually as a result of the mental health problems themselves, was a barrier. This indicates that perhaps some of the students most in need of help are not able to receive it. Still, 36.1% of students reported that none of the given reasons have inhibited them and 39.3% reported that none of the given reasons are currently inhibiting them

Table 6

Percentage of surveyed students who identified each barrier a past or current barrier for seeking mental health resources.

Barrier	Past Barrier	Current Barrier
I did not have enough information about how to seek out resources	14.8%	8.2%
I had fear or concern for how the impact of disclosing would have on how students, faculty, and staff would perceive me	37.7%	32.8%
I had fear or concern for how the impact of disclosing would have on how my parent(s), guardian(s), and family would perceive me	14.8%	8.2%
I was not actively enrolled in classes at the time	0%	0%
The hours of service didn't fit into my schedule	14.8%	19.7%
There was a long wait time for an appointment	23.0%	18.0%
None of these reasons have inhibited me from seeking out mental health resources	36.1%	39.3%

from seeking out mental health resources. This is a good sign that almost 40% of students do not experience barriers to seeking help.

When investigating stigma in particular as a barrier to seeking help, responses to "I would think less of a person who has received mental health treatment" were skewed towards disagree and responses to "Most people think less of a person who has received mental health treatment" were skewed to agree (Figure 7). With regards to personal opinions, almost all students responded on the side of disagree, but for the perception of what students think others think, this had far more responses on the agree end of the spectrum (Figure 8). Notably, most students viewed others as holding more stigmatizing views than they reported themselves as holding (Figure 9).
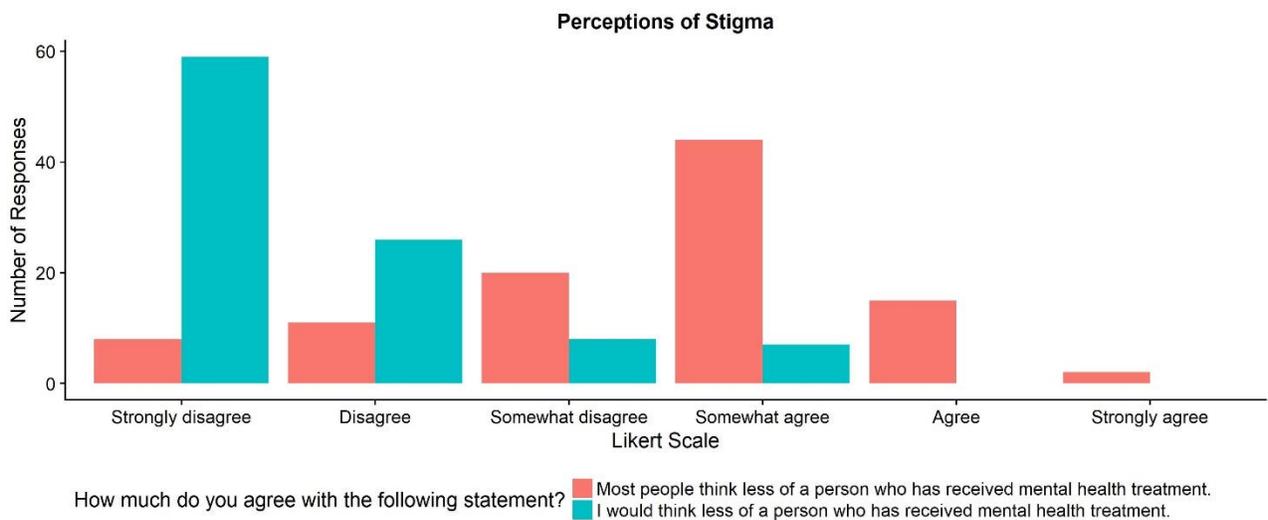

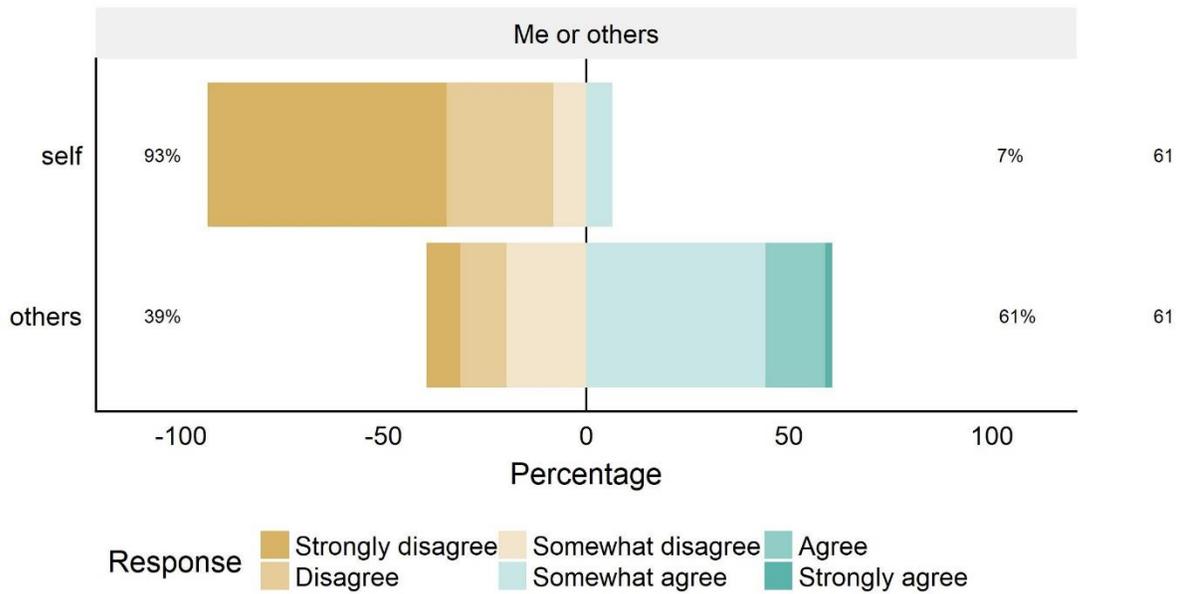Figure 7
Perceptions of Stigma bar plots
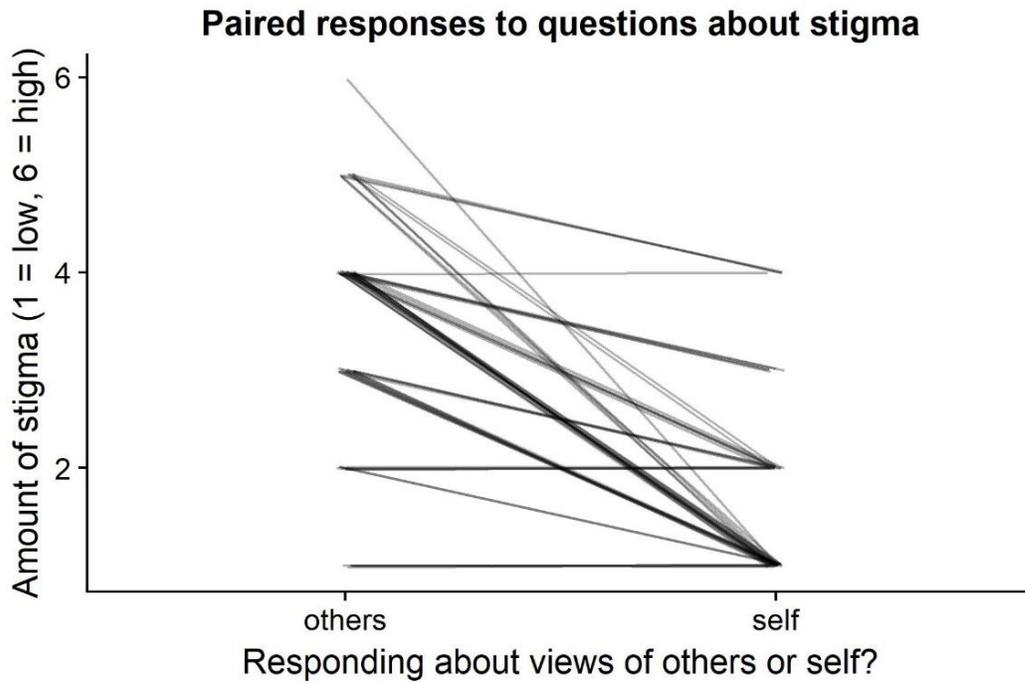
13

Figure 8
Perceptions of Stigma distributions

Figure 9
Perceptions of Stigma reaction norm approach

14

4. Discussion

4a. Discussion of Results

Mental health problems are prevalent among the introductory STEM college students who responded to our survey. 23% of students responded as having a previous diagnosis of a depressive disorder and 25% of students responded as having a previous diagnosis of an anxiety disorder. These prevalence rates are higher than what previous research has estimated for undergraduates where 15.6% of undergraduates screened positive for a depressive or anxiety disorder (Eisenberg et al. 2007). Students who screened positively on the depression screening or anxiety screening were more likely to screen positive on the other, confirming overlap between the two groups.

Two demographic groups—first-generation students and members of the LGBTQ+ community—were identified as being at higher risk of poor mental health. In this study, gender, race, state residency status, ECoach usage, and college GPA were not significant risk factors for screening positive for depression and/or anxiety. However, other research has shown identifying as female is associated with a higher risk of poor mental health (Eisenberg et al. 2007).

We hypothesized that students with higher diagnostic scores on the depression and anxiety screenings would have lower stress mindset scores, since lower stress mindset scores indicate a belief that stress is positive for health and performance. However, there was not a significant association between stress mindset scores and depression or anxiety scores.

We were particularly interested in student resource knowledge and usage. We found that the resources students are most aware of are CAPS (main office) and UHS at 85.2% and 80.3%, respectively. These were also the most used resources at 26.2% for CAPS and 16.4% for UHS. This was expected as they are large, campus-wide resources. In previous research done at

15

University of Michigan, similar percentages of students were aware of CAPS and UHS at 90% and 81%, respectively (Central Student Government 2017). However, in our survey more than half at 57.4% of students have not used any mental health services at University of Michigan. This demonstrates that although students are aware of various resources, many are not using them, likely for a variety of reasons.

One of these reasons may have been students' perception of if they needed help. Most students who screened positive on the depression and/or anxiety screening did perceive that they needed help within the last year. However, other research of college students has shown lack of perceived need to be a barrier for help seeking (Lipson et al. 2017). Interestingly, about half of students who did not screen positive for anxiety and/or depression in the past two weeks still perceived a need for help in the past twelve years. There are several possibilities for why this is. One is that even those who don't meet clinical criteria could benefit from help for stress and other mental health symptoms. Another possibility is that they needed professional help in the past year, but no longer did in the past two weeks, perhaps because receiving care significantly decreased their symptoms.

We also identified fear of student and faculty/staff opinions and long wait times as barriers to help-seeking. Moreover, there was a perception of stigma, even though most students did not report holding these stigmatized beliefs themselves. Though there is agreement about lack of time being a barrier, these results about stigma stand in contrast to other research that did not identify stigma as as crucial of a barrier as other factors like lack of time, lack of perceived need, and wanting to deal with issues on their own (Lipson et al. 2017). However, the Central Student Government survey did identify "fear or concern of being stigmatized by colleagues" as a

significant barrier (2017). Nonetheless, our results are encouraging because they generate the idea that providing students information on how low admitted stigma is may increase help-seeking.

Furthermore, a barrier written in by four students was related to a lack of motivation to seek help, usually as a result of the mental health problems themselves. This indicates that perhaps the students most in need of help are not able to receive it. Still, 36.1% of students reported that none of the given reasons have inhibited them in the past and 39.3% reported that none of the given reasons are currently inhibiting them from seeking out mental health resources. This is a good sign that almost 40% of students do not experience barriers to seeking help.

We were also interested in whether students who likely needed help were aware of where to go for help. Overall, regardless of screening positive or negative on the depression and/or anxiety screening, the majority or students know where to go on campus for help. This is a good sign that students feel confident they know where to go for help, regardless of if they need that help for themselves or perhaps a friend.

4b. Limitations of this Study

It is important to consider potential limitations of our study. First, all of our data was self-reported, such as reporting the depression screening, anxiety screening, and previous diagnoses. Though the PHQ-8 depression screening and GAD-7 anxiety screening are frequently used as screening tools, they are not equitable to an in-person interview with a mental health professional to diagnose any mental health conditions.

A second important potential limitation is the low response rate. Some demographic groups had a low number of responses, limiting the analyses and comparisons we could make. For example, for race and ethnicity we had to compare white vs. non-white rather than comparing more specific race/ethnicity groups. Moreover, we had intended to compare honors to non-honors

students but were not able to. Similarly, there was likely a bias in who took the survey. Students who care about mental health on campus or who have a mental health condition may have been more likely to take the survey since they value contributing to mental health research. Thus, our sample may not be representative of students in these courses as a whole.

However, comparing to a similar survey (Central Student Government 2017) does not indicate that our responses were strongly biased in terms of the mental health of respondents. For example, our survey found 23% of students reported a previous diagnosis of a depressive disorder and 25% of students reported a previous diagnosis of an anxiety disorder. The CSG Survey found 40% of students had been diagnosed with depression and 43% of students had been diagnosed with anxiety (Central Student Government 2017). Granted, it is possible that the CSG survey was also or even more skewed towards individuals who care about mental health on campus as we are not aware of the response rate to the CSG survey.

While the mental health of our respondents is in line with previous estimates, other aspects of the survey indicate overrepresentation of certain groups in our survey. For example, from our survey 36% of students reported identifying as a member of the LGBTQ+ community. This seemed high, so we compared it to the campus-wide U-M Asks You (UMAY) survey. Though the question was not asked in the same way, the 2017 UMAY survey found that 14% of students identified their sexual orientation as something other than heterosexual.

Similarly, from our survey 20% of students identified as first-generation students. In comparison, in 2013, 5.4% of University of Michigan students reported having parents who attended no college, and 5.2% reported having parents who attended some college, combined for a total of over 10% of first-generation students (Student Life Research).

4c. Future research directions

18

For future research, we are interested in surveying University of Michigan biology and physics students again to compare results across years. Ideally, we would also get a larger sample size to assess the generality of the results. This might allow us to compare the mental health of honors and non-honors students and varsity athlete and non-varsity athlete students. We may also be able to do more detailed race/ethnicity comparisons rather than just white vs. non-white. Moreover, we are interested in surveying non-STEM students, so we could compare responses of STEM and non-STEM students.

Future research directions could also include testing the efficacy of informing students about lack of admitted stigmatized opinions and seeing if this does in fact increase help-seeking.

5. Conclusion

Mental health is an important concern for college campuses to consider as the conversation and need for services continues to grow. 23% of students who responded to our survey reported a previous diagnosis of a depressive disorder and 25% reported a previous diagnosis of an anxiety disorder. Moreover, our survey found that students who identify as first-generation or a member of the LGBTQ+ community are at a greater risk of mental health problems. Clearly, there is a need for mental health services, especially for these at-risk students.

The good news is students are largely aware of resources, regardless of need. They are most aware of CAPS and UHS, the largest two resources for students. However, there are barriers that have prevented or prevent students from seeking help. The largest barriers include fear for how disclosing will affect student and faculty/staff perceptions and long wait times, as well as several students writing in lack of motivation. A fear of how others would perceive them for using services, or a perception of stigma, was a large contributing factor.

In summary, it is important to continue addressing student mental health on University of Michigan's campus and in general. We must work to increase student access to treatment and to decrease barriers to seeking help.

6. Acknowledgements

Works Cited

Center for Collegiate Mental Health. 2017, August. Standardized Data Set (SDS). (Publication No. U.Ed. STA 17-21)

Central Student Government Mental Health Taskforce Official Report. 2017. (Unpublished).

Crum, A. J., P. Salovey, and S. Achor. 2013. Rethinking stress: The role of mindsets in determining the stress response. *Journal of personality and social psychology*. **104**: 716.

Diener, E., D. Wirtz, W. Tov, C. Kim-Prieto, D. Choi, S. Oishi, and R. Biswas-Diener. 2010. New measures of well-being: Flourishing and positive and negative feelings. *Social Indicators Research*. **39**: 247-266.

Eisenberg, D., S.E. Gollust, E. Golberstein, and S.L. Hefner. 2007. Prevalence and correlates of depression, anxiety, and suicidality among university students. *American Journal of Orthopsychiatry*. **77**: 534-542.

Eisenberg, D., S.K. Lipson, A. Kern, P. Ceglarek, M. Phillips. S. Fogel, and A. Inscore. The Healthy Minds Study: 2016-2017 Data Report. (Unpublished).

Grant, H. and C.S. Dweck. 2003. Clarifying achievement goals and their impact. *Journal of Personality and Social Psychology*. **85**: 541-553.

Hunt, J. and D. Eisenberg. 2010. Mental health problems and help-seeking behaviors among college students. *Journal of Adolescent Health*. **46**: 3-10.

Kroenke, K., R.L. Spitzer, J.B.W. Williams, and B. Löwe. 2010. The Patient Health Questionnaire Somatic, Anxiety, and Depressive Symptom Scales: a systematic review. *General Hospital Psychiatry*. **32**: 345-359.

Lipson, S.K., J.M. Jones, C.B. Taylor, D.E. Wilfley, D.M. Eichen, E.E. Fitzsimmons-Craft, and D. Eisenberg. 2017. Understanding and promoting treatment-seeking for eating disorders and body image concerns on college campuses through online screening, prevention and intervention. *Eating Behaviors*. **25**: 68-73.

Robertson, P.K., S.J. Shema, D.J. Mundfrom, and T.M. Holmes. 1995. Analysis of paired Likert data: how to evaluate change and preference questions. *Family Medicine*. **27**: 671-675.

Spitzer, R.L., K. Kroenke, J.B.W. Williams, and B. Lowe. 2006. A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine*. **166**: 1092-1097.

University of Michigan Asks You (UMAY) Summary Report. 2017. (Unpublished).

World Health Organization. 2001. The World health report: 2001: Mental health: new understanding, new hope. Geneva: World Health Organization.

Student Life Research. *What proportion of UM students are first generation?* Retrieved from https://studentlife.umich.edu/research/article/what-proportion-um-students-are-first-generation-4

Consent form:

I am inviting Biology 171 and Physics 140 students to take part in a research study related to student mental health. By participating you may help me better understand mental health at Michigan, especially in large, introductory science courses.

- **One survey.** You'll take 1 survey that will take about approximately 20 minutes to complete.
- **Confidentiality.** The survey does not ask for your name and does not track IP addresses, so your responses cannot be linked to you.
- **Voluntary.** Taking this survey is voluntary.

What are the benefits of participation?

By participating in this survey, you may learn important information about available mental health services. It is anticipated that some students may seek needed services as a result of study participation. This research will be used to better understand mental health at Michigan, what mental health services students are aware of, and what barriers are there to seek out these services.

What are the risks of participation?

Some of the questions will ask you about sensitive or personal information such as your emotional health. Even if you decide to participate now, you may change your mind and stop taking the survey at any time. This screening is not a substitute for a clinical evaluation and is not an actual diagnosis, but may make you think more about potential mental health symptoms. If you are interested, you should contact a health professional for more information and a complete evaluation by consulting Counseling and Psychological Services (CAPS): https://caps.umich.edu/ The survey also gives several additional possible sources of support and information at the end of the survey. If responding to any questions makes you feel worried or unhappy, I urge you to contact CAPS or the resources provided at the very end of the survey.

Data will be stored on a managed MiDatabase server. These are approved for sensitive data storage.

Who's doing this study?

This study is being conducted as part of a senior honors thesis focused on mental health and resource usage in an introductory science class.

What if I have questions about the survey?

If you have any questions, comments, or concerns, you can contact the principal investigator of this study, Morgan Rondinelli at mprondin@umich.edu. The faculty advisor for this project is Dr. Meghan Duffy (duffymeg@umich.edu). If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researchers, please contact the University of Michigan Health Sciences and Behavioral Sciences Institutional Review Board, 2800 Plymouth Rd. Building 520, Room 1169, Ann Arbor, MI 48109-2800, (734) 936-0933, irbhsbs@umich.edu, or toll free (866) 936-0933.

Other information

We will retain responses from surveys that are only partially completed.

If you consent to participate in the mental health survey, click Continue to take the survey.

Survey questions:

#	Section	Item	Response Categories	Citation/Notes
-	**Positive Behaviors/ Positive Mental Health**	Below are 8 statements with which you may agree or disagree. Using the 1-7 scale below, indicate your agreement with each item by indicating that response for each statement.		Flourishing Scale (Diener et al. 2010)
1		I lead a purposeful and meaningful life.	-Strongly disagree -Disagree -Slightly disagree -Mixed or neither agree nor disagree -Slightly agree -Agree -Strongly agree	Flourishing Scale (Diener et al. 2010)
2		My social relationships are supportive and rewarding.	-Strongly disagree -Disagree -Slightly disagree -Mixed or neither agree nor disagree -Slightly agree -Agree -Strongly agree	Flourishing Scale (Diener et al. 2010)

3		I am engaged and interested in my daily activities.	-Strongly disagree -Disagree -Slightly disagree -Mixed or neither agree nor disagree -Slightly agree -Agree -Strongly agree	Flourishing Scale (Diener et al. 2010)
4		I actively contribute to the happiness and well-being of others.	-Strongly disagree -Disagree -Slightly disagree -Mixed or neither agree nor disagree -Slightly agree -Agree -Strongly agree	Flourishing Scale (Diener et al. 2010)
5		I am competent and capable in the activities that are important to me.	-Strongly disagree -Disagree -Slightly disagree -Mixed or neither agree nor disagree -Slightly agree -Agree -Strongly agree	Flourishing Scale (Diener et al. 2010)
6		I am a good person and live a good life.	-Strongly disagree -Disagree -Slightly disagree -Mixed or neither agree nor disagree -Slightly agree -Agree -Strongly agree	Flourishing Scale (Diener et al. 2010)
7		I am optimistic about my future.	-Strongly disagree -Disagree -Slightly disagree -Mixed or neither agree nor disagree -Slightly agree -Agree -Strongly agree	Flourishing Scale (Diener et al. 2010)
8		People respect me.	-Strongly disagree -Disagree -Slightly disagree	Flourishing Scale (Diener et al. 2010)

			-Mixed or neither agree nor disagree -Slightly agree -Agree -Strongly agree	
-	**Depression Screening**	Over the last two weeks, how often have you been bothered by any of the following problems?		PHQ-8 (Kroenke et al. 2010)
9		Little interest or pleasure in doing things	-not at all -several days -more than half the days -nearly every day	PHQ-8 (Kroenke et al. 2010)
10		Feeling down, depressed, or hopeless	-not at all -several days -more than half the days -nearly every day	PHQ-8 (Kroenke et al. 2010)
11		Trouble falling or staying asleep, or sleeping too much	-not at all -several days -more than half the days -nearly every day	PHQ-8 (Kroenke et al. 2010)
12		Feeling tired or having little energy	-not at all -several days -more than half the days -nearly every day	PHQ-8 (Kroenke et al. 2010)
13		Poor appetite or overeating	-not at all -several days -more than half the days -nearly every day	PHQ-8 (Kroenke et al. 2010)
14		Feeling bad about yourself - or that you are a failure or have let yourself or your family down	-not at all -several days -more than half the days -nearly every day	PHQ-8 (Kroenke et al. 2010)
15		Trouble concentrating on things, such as reading the newspaper or watching television	-not at all -several days -more than half the days -nearly every day	PHQ-8 (Kroenke et al. 2010)
16		Moving or speaking so slowly that other people could have noticed	-not at all -several days -more than half the days -nearly every day	PHQ-8 (Kroenke et al. 2010)

17		If you checked off any problems, how difficult have these problems made it for you at work, home, or with other people?	-not difficult at all -somewhat difficult -very difficult -extremely difficult	PHQ-8 (Kroenke et al. 2010)
-	**Anxiety Screening**	Over the last two weeks, how often have you been bothered by any of the following problems?		GAD-7 (Spitzer et al. 2006)
18		Feeling nervous, anxious, or on edge	-not at all -several days -more than half the days -nearly every day	GAD-7 (Spitzer et al. 2006)
19		Not being able to sleep or control worrying	-not at all -several days -more than half the days -nearly every day	GAD-7 (Spitzer et al. 2006)
20		Worrying too much about different things	-not at all -several days -more than half the days -nearly every day	GAD-7 (Spitzer et al. 2006)
21		Trouble relaxing	-not at all -several days -more than half the days -nearly every day	GAD-7 (Spitzer et al. 2006)
22		Being so restless that it is hard to sit still	-not at all -several days -more than half the days -nearly every day	GAD-7 (Spitzer et al. 2006)
23		Becoming easily annoyed or irritable	-not at all -several days -more than half the days -nearly every day	GAD-7 (Spitzer et al. 2006)
24		Feeling afraid, as if something awful might happen	-not at all -several days -more than half the days -nearly every day	GAD-7 (Spitzer et al. 2006)
-	**Diagnoses**			(Healthy Minds Study 2016-2017)
25		Have you ever been diagnosed with any of the following conditions	-Depression (e.g., major depressive disorder,	(Healthy Minds Study 2016-2017)

		by a health professional (e.g., primary care doctor, psychiatrist, psychologist, etc.)? (Select all that apply)	bipolar/manic depression, dysthymia, persistent depressive disorder) -Anxiety (e.g., generalized anxiety disorder, phobias, obsessive-compulsive disorder, post-traumatic stress disorder) -Attention disorder or learning disability (e.g., attention deficit disorder, attention deficit hyperactivity disorder, learning disability) -Eating disorder (e.g., anorexia nervosa, bulimia nervosa) -Psychosis (e.g., schizophrenia, schizo-affective disorder) -Personality disorder (e.g., antisocial personality disorder, paranoid personality disorder, schizoid personality disorder) -Substance abuse disorder (e.g., alcohol abuse, abuse of other drugs) -No, none of these [mutually exclusive] -Don't know [mutually exclusive]	
-	**Knowledge of Campus Services**			(Healthy Minds Study 2016-2017)
26		How much do you agree with the following statement?: If I needed to seek professional help for my mental or emotional health, I would know where to go on my campus.	-Strongly disagree -Disagree -Somewhat disagree -Somewhat agree -Agree -Strongly Agree	(Healthy Minds Study 2016-2017)
-	**Perceived Need**			(Healthy Minds Study 2016-2017)

27		How much do you agree with the following statement?: In the past 12 months, I needed help for emotional or mental health problems such as feeling sad, blue, anxious or nervous.	-Strongly disagree -Disagree -Somewhat disagree -Somewhat agree -Agree -Strongly Agree	(Healthy Minds Study 2016-2017)
-	**Help-seeking intentions**			(Healthy Minds Study 2016-2017)
28		If you were experiencing serious emotional distress, whom would you talk to about this? (Select all that apply)	-Professional clinician (e.g., psychologist, counselor, or psychiatrist) -Roommate -Friend (who is not a roommate) -Significant other -Family member -Religious counselor or other religious contact -Support group -Other non-clinical source (please specify) -No one [mutually exclusive]	(Healthy Minds Study 2016-2017)
-	**Use of counseling/ therapy**			(Center for Collegiate Mental Health 2017)
29		Have you ever received counseling or therapy for mental health concerns?	-No, never -Yes, prior to starting college -Yes, since starting college -Yes, both of the above (prior to college and since starting college)	(Center for Collegiate Mental Health 2017)
-	**Informal help-seeking**			(Healthy Minds Study 2016-2017)
30		In the past 12 months have you received counseling or support for your mental or emotional health from any of the following sources? (Select all that apply)	-Roommate -Friend (who is not a roommate) -Significant other -Family member -Religious counselor or other religious contact	(Healthy Minds Study 2016-2017)

			-Support group -Other non-clinical source (please specify) -No, none of these [mutually exclusive]	
31		If you had a mental health problem that you believed was affecting your academic performance, which people at school would you talk to? (Select all that apply)	-Professor from one of my classes -Academic advisor -Another faculty member -Teaching assistant -Services for Students with Disabilities (SSD) -Dean of Students or class dean -Other (please specify) -No one [mutually exclusive]	(Healthy Minds Study 2016-2017)
32		During this school year have you talked with any academic personnel (such as instructors, advisors, or other academic staff) about any mental health problems that were affecting your academic performance?	-Yes -No	(Healthy Minds Study 2016-2017)
-	**University of Michigan specific resources**			Adapted from (Central Student Government 2017)
33		What on-campus mental health services are you aware of?	-Counseling and Psychological Services (CAPS) in the Union/Main Office -Counseling and Psychological Services (CAPS) Embedded Model – a CAPS counselor within my school -University Health Service (UHS) -UM Psychological Clinic -Department of Psychiatry of Outpatient Clinics (Depression Center, Anxiety Disorders Clinic, etc.)	Adapted from (Central Student Government 2017)

			-Psychiatric Emergency Services (PES) -Mental health student organizations (Active Minds, Wolverine Support Network, etc.) -I am not aware of any mental health services at UM [mutually exclusive] -Other (please enter):	
34		What on-campus mental health services have you utilized during your time at Michigan?	-Counseling and Psychological Services (CAPS) in the Union/Main Office -Counseling and Psychological Services (CAPS) Embedded Model – a CAPS counselor within my school -University Health Service (UHS) -UM Psychological Clinic -Department of Psychiatry of Outpatient Clinics (Depression Center, Anxiety Disorders Clinic, etc.) -Psychiatric Emergency Services (PES) -Mental health student organizations (Active Minds, Wolverine Support Network, etc.) -I have not utilized any mental health services at UM [mutually exclusive] -Other (please enter):	Adapted from (Central Student Government 2017)
-	**Barriers to seeking help**			(Central Student Government 2017)
35		What has been a barrier to seeking out mental health resources on campus?	-I did not have enough information about how to seek out resources	(Central Student Government 2017)

			-I had fear or concern for how the impact disclosing would have on how students, faculty and staff would perceive me -I had fear or concern for how the impact disclosing would have on how my parent(s), guardian(s), and family would perceive me -I was not actively enrolled in classes at the time -The hours of service didn't fit into my schedule -There was a long wait time for an appointment -None of these reasons have inhibited me from seeking out mental health resources [mutually exclusive] -Other (please enter):	
36		What is currently a barrier to seeking out mental health resources on campus?	-I did not have enough information about how to seek out resources -I had fear or concern for how the impact disclosing would have on how students, faculty and staff would perceive me -I had fear or concern for how the impact disclosing would have on how my parent(s), guardian(s), and family would perceive me -I was not actively enrolled in classes at the time -The hours of service didn't fit into my schedule -There was a long wait time for an appointment -None of these reasons have inhibited me from seeking out mental health resources [mutually exclusive] -Other (please enter):	(Central Student Government 2017)

-	**Stigma**	How much do you agree with the following statement?:		Healthy Minds Study 2016-2017
37		Most people think less of a person who has received mental health treatment.	-Strongly disagree -Disagree -Somewhat disagree -Somewhat agree -Agree -Strongly Agree	Healthy Minds Study 2016-2017
38		I would think less of a person who has received mental health treatment.	-Strongly disagree -Disagree -Somewhat disagree -Somewhat agree -Agree -Strongly Agree	Healthy Minds Study 2016-2017
-	**Perceptions of campus climate**			Healthy Minds Study 2016-2017
39		How much do you agree with the following statement?: At my school, I feel that the campus environment has a negative impact on students' mental and emotional health.	-Strongly disagree -Disagree -Somewhat disagree -Somewhat agree -Agree -Strongly Agree	Healthy Minds Study 2016-2017
-	**Stress mindset**	"Please rate the extent to which you agree or disagree with the following statements."		Stress Mindset Measure (Crum et al. 2013)
40		Experiencing stress depletes health and vitality.	-Strongly disagree -Disagree -Somewhat disagree -Somewhat agree -Agree -Strongly Agree	Stress Mindset Measure (Crum et al. 2013)
41		Experiencing stress enhances performance and productivity.	-Strongly disagree -Disagree -Somewhat disagree -Somewhat agree -Agree -Strongly Agree	Stress Mindset Measure (Crum et al. 2013)
42		Experiencing stress inhibits learning and growth.	-Strongly disagree -Disagree -Somewhat disagree -Somewhat agree	Stress Mindset Measure (Crum et al. 2013)

			-Agree -Strongly Agree	
43		The effects of stress are positive and should be utilized.	-Strongly disagree -Disagree -Somewhat disagree -Somewhat agree -Agree -Strongly Agree	Stress Mindset Measure (Crum et al. 2013)
-	**Clarifying achievement goals and their impact**	How much do you agree with the following statements?:		Adapted in (Healthy Minds Study 2016-2017) from Achievement Goal Inventory (Grant and Dweck 2003)
44		It is very important to me to do well in my courses.	-Strongly disagree -Disagree -Somewhat disagree -Somewhat agree -Agree -Strongly Agree	Adapted in (Healthy Minds Study 2016-2017) from Achievement Goal Inventory (Grant and Dweck 2003)
45		It is important to me to confirm my intelligence through my schoolwork.	-Strongly disagree -Disagree -Somewhat disagree -Somewhat agree -Agree -Strongly Agree	Adapted in (Healthy Minds Study 2016-2017) from Achievement Goal Inventory (Grant and Dweck 2003)
46		In school I am always seeking opportunities to develop new skills and acquire new knowledge.	-Strongly disagree -Disagree -Somewhat disagree -Somewhat agree -Agree -Strongly Agree	Adapted in (Healthy Minds Study 2016-2017) from Achievement Goal Inventory (Grant and Dweck 2003)
47		It is very important to me to feel that my coursework offers me real challenges.	-Strongly disagree -Disagree -Somewhat disagree -Somewhat agree -Agree -Strongly Agree	Adapted in (Healthy Minds Study 2016-2017) from Achievement Goal Inventory (Grant and Dweck 2003)
-	**Demographic data**			
48		What is your gender?	-female	

			-male -non-binary -prefer not to say	
49		What is your race/ethnicity?	-African American or Black -Asian or Asian American -Hispanic/Latinx -Middle Eastern/North African -White -More than one race/ethnicity -Other	
50		What is your family's income?	-<$40,000 -$40-65,000 -$65,000-90,000 -$90,000-120,000 -$120,000-160,000 -$160,000-200,000 ->$200,000	
51		Do you identify as a first-generation college student?	-Yes -No -I'm not sure	
52		Are you part of the Honors Program in LSA?	-Yes -No -I'm not sure	
53		Are you part of the Comprehensive Studies Program?	-Yes -No -I'm not sure	
54		Are you an in-state, out-of-state, or international student?	-In-state -Out-of-state -International	
55		What was your high school GPA?		
56		What is your current GPA at Michigan?		
57		Are you a varsity athlete at Michigan?	-Yes -No	
58		Have you used the exam playbook in ECoach?	-Yes -No -I'm not sure	

59		Do you identify as a member of the LGBTQ+ community?	-Yes -No	