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Baseline Data Collection on the Overall Health of First-Year Engineering Students at the University of Arkansas

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First-Year Engineering Students at the University of Arkansas

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Abstract

Many factors contribute to college student's success both inside and outside of the classroom. Physical activity, mental health, sleep, and grit are key influencers for academic achievement and retention. Exercise is Medicine (EIM) On Campus is part of a worldwide initiative through the American College of Sports Medicine that recognizes the importance of physical activity for health by both assessing and promoting physical activity to all students, faculty, and staff. The EIM survey is a tool for collecting general health information about a campus population, as it consists of questions on demographic information, health status, familial health history, diet choices, food security, mental health, substance use, physical activity, sleep, and grit.

Information in this study was gathered to provide insight into the health status of First-Year Engineering students at the University of Arkansas to establish a baseline data set for use in future studies on student success and positive campus health interventions. This population consisted of approximately 583 students enrolled full-time as First-year students in the College of Engineering during the Fall Semester of 2019. There were 470 valid survey responses (350 male and 120 female).

Preliminary results demonstrate low physical activity levels, high levels of poor sleep quality, mental health issues, and above-average grit in first-year engineering students across both genders. Males were found to have a higher frequency of exercise while females were found to have a higher frequency of mental health issues. Both groups showed similar sleep qualities and quantities. Females had a significantly greater average grit score than males. All these areas can be subject to future studies on correlation and prevalence amongst engineering students or in comparison to other disciplines.

1. Introduction

The transition from high school to a four-year college is a socio-contextual shift that affects every aspect of a student's life. When starting college, there are greater academic demands, changes in family and peer relationships, an increased perception of stress, and greater personal responsibility (1). In the struggle to balance the new workload and lifestyle, the health and overall well-being of freshman college students are often neglected. The World Health Organization defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (2). Wholistic health has many different internal and external factors that contribute to it. Sleep quality is very important for everyone as sleep is a fundamental human need for survival, health, and well-being (3) The intrapersonal construct of grit is emerging as an overlooked factor that could play an important role in college student health (4). There have also been numerous studies on the relationship between physical activity and mental health, with a focus on how regular physical activity can reduce symptoms occurrence of mental health issues (5). New studies are beginning to look at how physical activity affects multiple different aspects of a college student's life and could even contribute to improved academic success.

Research has shown that there is a substantial decrease in physical activity in the transitional period, leading to approximately 62% of college students to be insufficiently active (6, 7). Being sedentary has been shown to lead to a higher risk of heart disease, certain cancers, type 2 diabetes, and early death (8). Exercise is Medicine (EIM) On Campus is part of a worldwide initiative through the American College of Sports Medicine (ACSM), a world-leading professional organization in sports and exercise science (9). The initiative recognizes the importance of physical activity for health by both assessing and promoting physical activity to all students, faculty, and

staff. EIM-OC encourages faculty, staff, and students to work together toward improving the health and well-being of the campus community by:

1. Making movement a part of the daily campus culture.

2. Assessing physical activity at every student health visit.

3. Providing students with the tools necessary to strengthen healthy physical activity habits that can last a lifetime.

4. Connecting university health care providers with university health fitness specialists to provide a referral system for exercise prescription.

Exercise is Medicine On Campus engages stakeholders in campus recreation, student health care, and academics, as well as other motivated wellness initiatives on campus. The EIM survey is a tool for collecting general health information about a campus population. The EIM survey consists of questions on demographic information, health status, familial health history, diet choices, food security, mental health, substance use, physical activity, sleep, and grit. All these components play a collective part in the general wellbeing of an individual.

1.1 Physical Health

Physical activity plays an important role in wholistic health with benefits such as reduced stress, increased mental health, and better sleep (8). The Physical Activity Guidelines for Americans, issued by the U.S. Department of Health and Human Services, suggests that adults should do at least 150 minutes to 300 minutes of moderate-intensity or 75 minutes to 150 minutes of vigorous-intensity aerobic activity a week for substantial health benefits (10). Moderate activities include brisk walking, leisurely biking, and yoga but vigorous intensity activities require

a higher level of effort. Vigorous Physical Activity has mental health benefits beyond moderate physical activity, as running and swimming laps require more effort and concentration (11).

Recommendations are an important tool for encouraging people to meet health-benefiting activity levels, but knowledge of recommendations does not increase engagement (12). College students typically seem to focus on immediate lifestyle as opposed to long-term lifestyle and wellbeing. Completing physical activity to the suggested levels can be overwhelming in a college environment, but any movement is better than none. Prescribing a lower amount of activity than the standard recommended amount has been shown to promote more adaptive activity mindsets leading to improvements in physical activity levels amongst college students (12). Students who meet vigorous physical activity recommendations have been found to be less likely to report perceived stress and poor mental health than students who do not meet the recommendations (6). Further, sedentary behavior has been positively associated with depression, anxiety, and stress in college students (13). The association between physical activity and mental health has been established, but more work is needed in finding effective approaches to promote following The Physical Activity Guidelines in college and university settings (14). With an increase in physical activity on campus, the positive effects of exercise are hoped to improve mental health, sleep quality, and academic success of students.

1.2 Mental Health

Mental health is defined as optimal personal function including fulfilling relationships with people, the ability to adapt to change, productive activities, and coping with adversity (5). There has been a great deal of focus on mental health awareness as it is a growing movement amongst college campuses across the nation. The mental health of young adults is becoming increasingly

significant as it has been linked to both short term outcomes, such as academic performance and retention, and longer-term outcomes, like future economic productivity (15). The average rates of student self-reported depression and anxiety have increased over the past eight years (16). Research on the campus mental health crisis has resulted in increased resources, but not increased prevention. Studies have shown that there is a correlation between a higher frequency of regular physical exercise and fewer poor mental health days (5).

According to the World Health Organization, depression is the most debilitating disease in the world and an emerging public health problem (5, 17). Depression is clinically characterized by obvious changes in decision making that cause impairment and distress (17). Symptoms include loss of pleasure or interest, feelings of guilt or low self-worth, decreased energy, disturbed sleep, change in appetite, and poor concentration (5). 21.6% of college students reported that depression was a factor that negatively impacted their academic performance (18). Depression increases physical distress and health problems, leading to impairments of quality of life and functional well-being.

Anxiety consists of strong emotional responses of fear and dread as well as physical signs such as rapid heartbeat and perspiration (19). Both academic and non-academic sources can have effects on anxiety levels in engineering students such as academic readiness, personality type, curriculum requirements, and attitude towards learning (20). Malfunctions in the mechanisms that control the appropriate regulation of anxiety can lead to excessive or inappropriate expressions of anxiety such as panic attacks, phobias, and generalized anxiety (19). Such anxiety may result in compromised student self-efficacy presenting itself as reduced concentration, motivation, or reasoning capability (20). According to the American College Health Association, 30.7% of undergraduate students felt overwhelming anxiety within the past two weeks, with 29.5% reporting

that anxiety negatively impacted their academic performance (18). It has been found that females are more likely than males to experience anxiety, with 72.3% of undergraduate females reporting having felt overwhelming anxiety anytime within the past year but only 50.9% of males (18).

Students of STEM courses face different stressors such as being required to take large lectures where faculty often utilize practices to "weed out" students, which contributes to a highly competitive environment that discourages collaborative learning (15). Psychosocial stress leads to a cascade of psychological and physiological responses, such as anxiety, heart rate, and cortisol (21). High levels of stress have been associated with higher burnout rates, decreased sleep quality, increased depressive symptoms, and decreased overall quality of life (11). A study on the cardiovascular health of university students found that 56% of students rated their stress level as high or very high. The main cause of this stress was said to be exams and course assignments (22). One study showed that the stress levels among engineers were higher while exercising rates lower than other academic disciplines (15). Low vigorous activity levels are associated with a particularly high-stress response in people who perceive high levels of stress in their lives in general (21).

According to a previous study, engineering students had the lowest likelihood of seeking help when faced with any mental health issue, with less than one fourth with apparent mental health problems seeking help (15). A correlation between physical activity and mental health burden was lowest when individuals engage in about 45 minutes of exercise 3-5 days a week (23). Aerobic physical activities have been found to improve mental health for those with symptoms of anxiety and depression (19). Exercise has been found to achieve a larger reduction in mental health symptoms than no treatment or other interventions such as medicine (24).

1.3 The Pittsburgh Sleep Quality Index (PSQI)

Over the past 20 years, research has identified a reduction in the average hours of sleep among college students (25). 60% of college students self-reported to be categorized as poor sleepers (1, 26). This can be attributed to students sacrificing sleep to study, intake of caffeine, frequent use of technology before bed, early classes, and sleeping long hours on the weekend (3, 25). The National Sleep Foundation recommends that younger adults, age 18-25, get 7-9 hours of sleep per night (27). Poor sleep quality can negatively affect both physical and psychological disorders including increased risk of infections and diabetes as well as increased anxiety, attention, and antisocial personality problems (3). A sleep disturbance is a common symptom of depression and represents one of nine symptoms of a depressive episode. Recent research has shown that sleep disturbances may precede depression rather than just be a symptom of the disorder (28).

Poor sleep quality, delayed sleep onset latency, and shortened sleep duration can have a significant impact on student's daytime functioning (26). 24.3% of undergraduate students cited sleep difficulties as a factor in decreased academic performance (18). Sleep difficulties are associated with poor performance on tasks measuring mental flexibility, attentional set shifting, working memory, and inhibition (28). Preliminary studies have shown that females were more likely than males to report a sleeping problem and to meet cutoff criteria for poor sleep (26). In comparison with students with good sleep behaviors, students with poor sleep quality often miss classes, resulting in lower grade point averages and more withdrawals (25).

Previous studies have indicated that regular exercise may help promote healthy sleep habits. Students who engaged in greater than 60 minutes of physical activity daily have been found to have higher odds of sufficient sleep than those who did not engage in 60 minutes on any day

(29). Daily physical activity may also help to create a more regular sleep schedule, which is beneficial for obtaining sufficient sleep (29).

1.4 Short Grit Scale

The ability to cope with the stressors associated with the college environment is important for maintaining both physical and mental health (6). Grit is defined as trait-level perseverance and passion for long-term goals, which is comprised of two domains: perseverance of effort and consistency of interest (4, 30). It entails working earnestly towards challenges, maintaining effort and interest over years despite failure and adversity. Grit is important for students to have the ability to overcome a difficult situation when they arise and has been shown to predict achievement in challenging domains above the measures of talent (13, 30). Undergraduates who score higher in grit tended to also earn higher GPAs than their peers, despite having lower SAT scores (4). Both grit and physical activity have been investigated independently as important factors for student success, but little research has gone as fat to examine grit and physical activity concurrently in students (13).

The retention rates after the 1st term and 1st semester over the past 10 years for the University of Arkansas as a whole and specifically the First-Year Engineering Program are shown in Table 1 below (31). The College of Engineering retention rates have decreased over the past five years, but the retention rates of the university as a whole have increased (31). The relationship between physical activity and retention rates need to be further studied within the College of Engineering as compared to all The University of Arkansas.

Table 1. University and engineering 1st year retention rates (29)

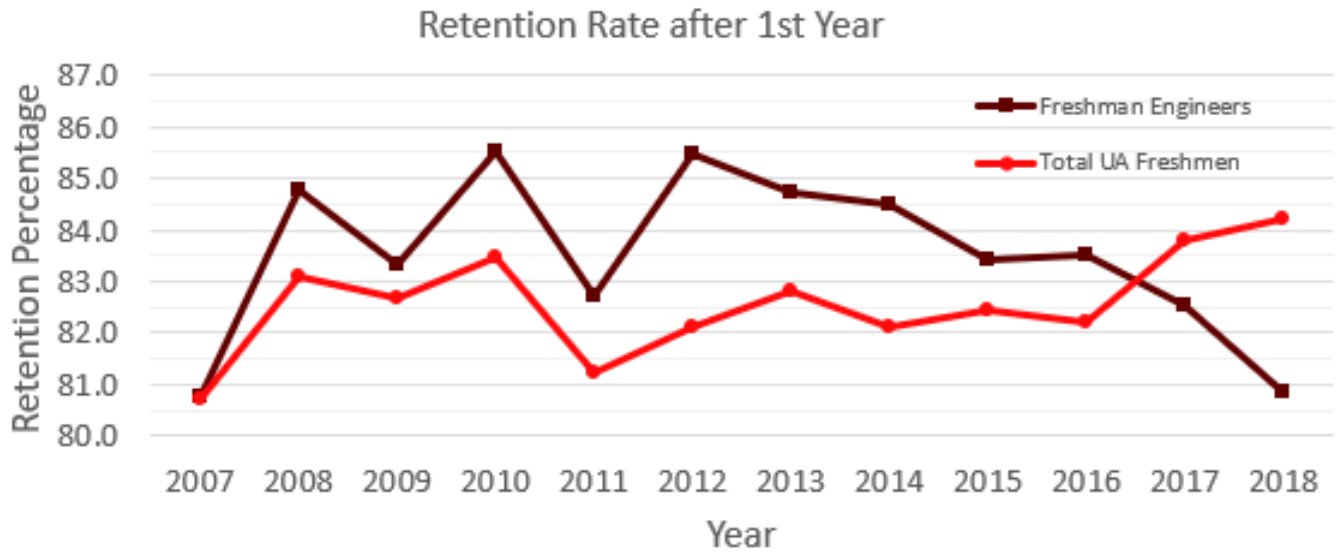|	University of Arkansas					First-Year Engineering Program				
	Student Count	1st Term		1st Year		Student Count	1st Term		1st Year	
		UA Retain	Left Transfer	UA Retain	Left Transfer		UA Retain	Left Transfer	UA Retain	Left Transfer
Year	N	%	%	%	%	N	%	%	%	%
2007	2,879	92.4	7.6	80.7	19.3	343	92.7	4.7	80.8	7.9
2008	2,979	92.3	7.7	83.1	16.9	420	93.6	2.1	84.8	7.6
2009	2,891	92.3	7.7	82.7	17.3	384	91.4	3.9	83.3	8.1
2010	3,780	93.8	6.2	83.5	16.5	518	95.4	2.1	85.5	7.3
2011	4,414	92.4	7.6	81.2	18.8	666	93.7	2.7	82.7	9.3
2012	4,550	92.9	7.1	82.1	17.9	771	94.7	2.3	85.5	7.3
2013	4,300	92.7	7.3	82.8	17.2	674	95.1	2.1	84.7	8.0
2014	4,518	92.6	7.4	82.1	17.9	709	94.4	1.6	84.5	7.8
2015	4,871	92.9	7.1	82.4	17.6	802	94.9	2.4	83.4	8.0
2016	4,938	92.8	7.2	82.2	17.8	754	94.7	2.4	83.5	7.2
2017	5,032	93.3	6.7	83.8	16.2	795	92.8	3.4	82.5	8.2
2018	4,977	93.8	6.2	84.2	15.8	815	92.8	2.3	80.9	7.9

Figure 1. University and engineering 1st year retention percentage over the past 10 years (29).

1.5 Significance of Work

Information in this study was gathered to provide insight into the health status of First-Year Engineering students at the University of Arkansas to establish a baseline level for possible future ways for positive health interventions. The information found in this study provided insight into the health status of First-Year Engineering students and be able to propose possible ways to solve the physical and mental health problems identified. Campus stakeholders can use EIM results as benchmark data to design and evaluate future interventions aimed at improving the health and wellness of the University of Arkansas's engineering community. Following the results of the survey, exploratory analyses to assess is a difference in the presence of mental health issues, sleep problems, and grit scale scores based on gender were conducted.

2. Materials and Methods

2.1 Materials

Exercise is Medicine- On Campus, study is conducted using a survey consisting of questions on demographic information, health status, familial health history, Depression Anxiety Stress Scales Short Form (DASS-21), the International Physical Activity Questionnaire (IPAQ), The Pittsburgh Sleep Quality Index (PSQI), Short Grit Scale, Diet Evaluations, and the USDA Food Security Survey.

Depression Anxiety Stress Scales Short Form (DASS-21)

The short version of Depression Anxiety Stress Scales Short Form (DASS-21) is a measure of mental health focusing on the three traits of depression, anxiety, and stress. The DASS-21 is a 21 item self-report instrument designed to measure the three related negative emotional states of depression, anxiety, and stress/tension. It consists of 7 items per scale with subjects asked to use a

4-point severity/frequency scale to rate the extent of experiences over the past week (32). The depression scale assesses hopelessness, lack of interest, dysphoria, anhedonia, and devaluation of life (32). The anxiety scale assesses skeletal muscle effects, situational anxiety, and autonomic arousal (32). The stress scale assesses nervous arousal, difficulty relaxing, irritable/over-reactive, and impatient (32). Psychometric analyses of the DASS has provided strong support for the internal consistency and convergent and discriminant validity of the three scales (33).

The Pittsburgh Sleep Quality Index (PSQI)

The PSQI provides a standardized, quantitative measure of sleep quality that quickly identifies good and poor sleepers (34). It assesses sleep quality during the past month and consists of 19 self-rate questions with 7 subcategories: sleep quality, sleep duration, sleep latency, habitual sleep efficiency, use of sleeping medications, sleep disturbances, and daytime dysfunction (3, 34). These items are grouped into seven component scores that are summed to yield a global PSQI score. PSQI scores have a range of 0-21, as each component is weighted equally on a 0-3 scale, with a final composite global score of 5 or higher indicating poorer quality of sleep (34).

Short Grit Scale

The Grit-S questionnaire is an efficient measure of trait-level perseverance and passion for long-term goals that consist of 8 self-rated statements across the two domains of consistency of interest and perseverance of effort (13). Answers are selected based on the level the statement applies to the person, considering how they compare to most people. The grit score is calculated through the average of the eight items to provide an estimation of individual grittiness (35). The maximum score on this scale is 5 (extremely gritty) and the lowest score on this scale is 1 (not at all gritty) (4, 30).

2.2 Methods

The study population selected was the First-Year Engineering students enrolled at the University of Arkansas in Fayetteville, Arkansas during the academic year of 2019-2020. This population consisted of approximately 583 students enrolled full-time as First-year students in the College of Engineering during the Fall Semester of 2019. The survey was distributed to the first-year engineering students through Qualtrics Survey Software through the Peer Mentor program during "Health Awareness Week", November 4th-8th, 2019.

Prior to any data analysis being completed, Institutional Review Board approval was obtained. The study was a secondary data analysis utilizing previously de-identified data, no direct contact with subjects was necessary. A cover letter describing the survey, confidentiality, and voluntary participation was provided to the students and is shown in Appendix A. It is assumed that all of the students who responded to the Exercise is Medicine Survey answered honestly and to the best of their ability. The study also assumed all data from the survey was recorded accurately and completely, to the best of the original researchers' abilities. However, since this study relies predominantly on self-reported measures, response bias and shared method variance should be considered possible.

This study will have limited external validity to populations outside of First-Year Engineering students at the University of Arkansas because it cannot be assumed that other undergraduate student populations within the U.S. have similar demographics or provide their students with a similar health survey. The results of the proposed study may only be used to make statements about the University of Arkansas First-Year Engineering student population with the aforementioned delimitations in mind.

2.3 Data Analysis

For the analysis of the data collected by the EIM Survey, Stata/IC 15.0, Excel, and JMP Pro 15 were used. Descriptive statistics were used to characterize the sample. Students aged 18 and under and 23 and older were excluded from the analysis. Student survey respondents must have completed the survey in its entirety, providing responses to all survey items to be included in the final analysis. After setting these boundaries and excluding students with missing values, there were 473 valid survey responses. Those that responded "Other" to gender were not included as there was not a statistically significant sample size. A total sample size of 470 first-year engineering students between the ages of 18-22 was used in the final analysis. The respondents were separated by gender, leading to a group of 350 male respondents and 120 female respondents. Survey responses Statistical analysis was performed using chi-squared analyses and a two-tailed t-test assuming unequal variances. For all analyses performed, a *p*-value of less than .05 was considered significant.

3. Results

Results were examined by responses between male and female survey participants. The average male respondent was 18.72 years old and the average female respondent was 18.64. Males made up most of the respondents at 74.47% with 350 responses, while females only accounted for 25.53% of the total respondents with only 120 responses. A majority of respondents reported their ethnicity to be white and non-Hispanic. A summary of the demographic characteristics of the study population is displayed in Table 2. Also seen are the self-reported diagnosed with a mental health issue, weekly activity during leisure time, and sleep quality.

3.1 Demographics and Self-Reports

Table 2. Survey demographics and self-reports

Survey Item	Males	Females
Age (mean)	18.72	18.64
Gender		
Total Responses	350	120
Percent of Total	74.47%	25.53%
	Percentage of Males	**Percentage of Females**
Race		
Asian Pacific	6.29	5.83
Black	3.14	5.83
Indian/Alaskan	0	0
White	80.00	79.17
2 or more Races	10.57	9.16
Ethnicity		
Non-Hispanic	89.14	91.667
Hispanic	10.86	8.333
Anxiety		
Diagnosed	10.86	22.50
Alone	28.95	33.33
With Depression	57.89	55.55
With another disorder	34.21	25.93
Not Diagnosed	89.14	77.5
Depression		
Diagnosed	8.29	13.33
Alone	21.43	6.25
With Anxiety	78.57	93.75
With another disorder	32.14	25.00
Not Diagnosed	91.71	86.67
Vigorous Physical Activity		
0 days a week	50.28	59.17
1-3 days a week	34.00	34.17
4-7 days a week	15.71	6.66
Moderate Physical Activity		
0 days a week	60.98	72.5
1-3 days a week	30.18	24.17
4-7 days a week	8.84	3.33
Self-Rated Sleep Quality		
Very Good	10.23	13.45
Fairly Good	61.99	62.18
Fairly Bad	24.56	21.01
Very Bad	3.22	3.36

3.2 Physical Activity

The first analysis was run between gender and participation in physical activity. 49.71% of males perform vigorous activity at least once a week compared to 40.83% of females. 39.02 of men and only 27.5% participate in moderate amounts of activity at least once a week in their free time. Chi-squared analysis of these two variables revealed a *p*-value of 0.023533, leading to the conclusion there is a significant disparity between genders in physical activity levels. It is evident that males more frequently exercise than females.

3.3 Depression Anxiety Stress Scales Short Form (DASS-21)

Based on self-reporting, only 8.9% of males and 13.33% of females have been clinically diagnosed with depression. According to the depressive scale of the DASS-21, 39% of males and 45% of females classify as having some level of depression ranging from mild to extremely severe (Figure 2). Chi-squared analysis was performed, and it was found that the prevalence of depression is not significantly different between the population of each gender because the *p*-value is 0.116676.
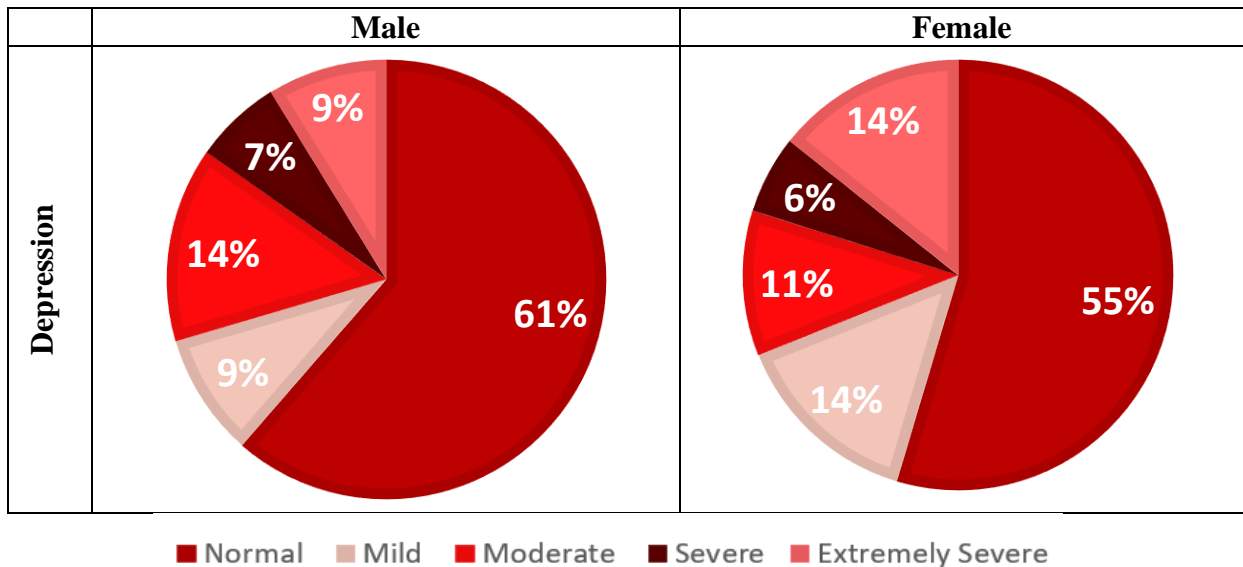

Figure 2. Prevalence of depression based off DASS-21 scores in Males and Females

Based on self-reporting, only 10.86% of males and 22.5% of females are clinically diagnosed with anxiety. According to the anxiety scale of the DASS-21, 34% of males and 51% of females classify as having some level of anxiety ranging from mild to extremely severe. A p-value of 0.0038 was calculated through chi-squared analysis, therefore meaning there is a significant difference in the presence of anxiety amongst male and female first-year engineering students. As seen in Figure 3 below, over half of female students experience some level of symptoms of anxiety.
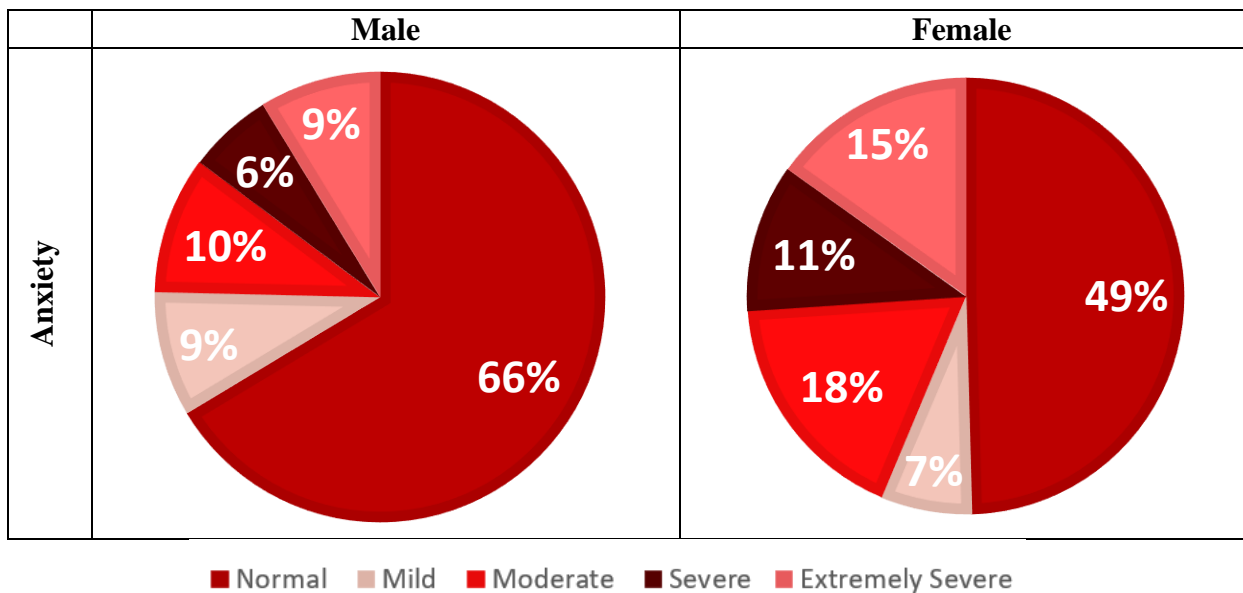

Figure 3. Prevalence of anxiety based off DASS-21 scores in Males and Females

A majority of first-year engineering students are not overly stressed, with only 23% of males and 36% of females showing symptoms of stress (Figure 4). Chi-squared analysis between gender and stress was performed and found to have a p-value of 0.0169. It can be concluded that the prevalence of stress is significantly different across genders, with a higher percentage of females affected than males.
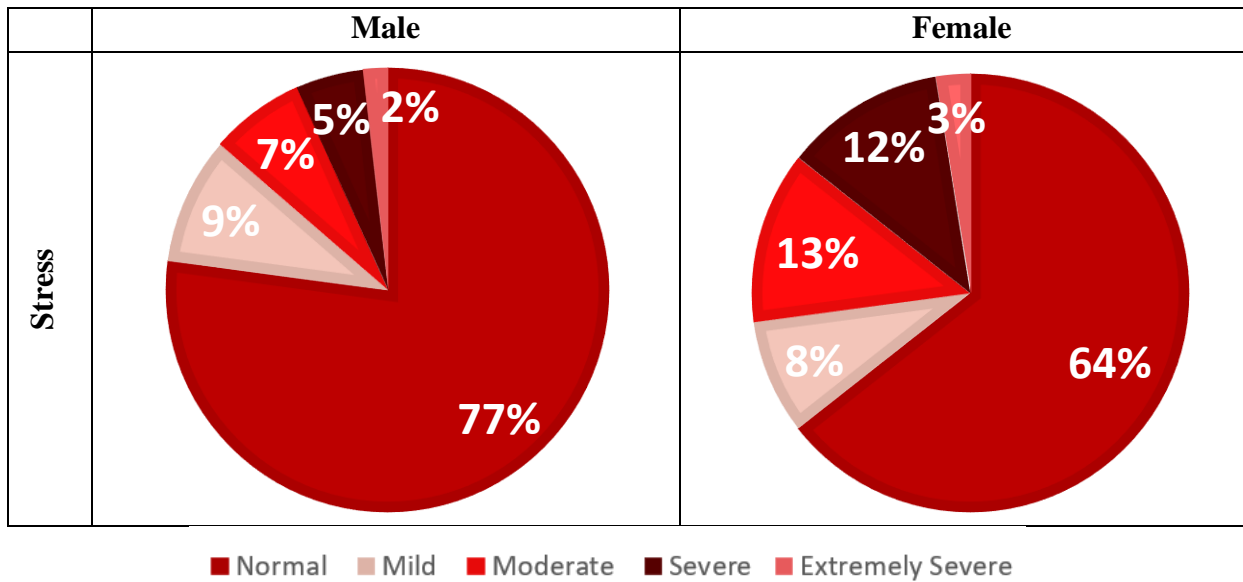
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Figure 4. Prevalence of stress based off DASS scores in Males and Females

3.4 The Pittsburgh Sleep Quality Index (PSQI)

There is a disparity between self-reported sleep quality and that calculated based on the PSQI. More than half of all participants would be considered classified as a poor sleeper (Table 3). The chi-squared analysis resulted in a *p*-value of 0.623, meaning there is no significant difference in sleep quality across genders.

The average hours of sleep on weekdays is 6.59 hours (SD=1.43) for males and 6.73 hours (SD=1.23) for females. The hours of sleep increase on the weekends by approximately 1.5 hours (Table 3). Another chi-squared analysis was performed to also show there is not a significant difference in sleep quantity between genders with a *p*-value of 0.947.

Table 3. Sleep quality and quantity in Males and Females

Sleep Quality	Males	Females
Self-Reported		
Good	72.22%	75%
Poor	27.77%	25%
PSQI		
Good	46.45%	43.86%
Poor	53.55%	56.14%
Hours of Sleep (Mean)		
Weekdays	6.59	6.73
Standard Deviation	1.43	1.23
Weekend	8.12	8.34
Standard Deviation	1.59	1.38

3.5 Short Grit Scale

The maximum score on this scale is 5 (extremely gritty), and the lowest score on this scale is 1 (not at all gritty). A bell curve of grit scores is observed in Figure 5 below. Therefore, a two-tailed t-test was performed resulting in a p-value of 0.017. Females were found to be significantly more gritty than with an average grit score of 3.48 (SD=0.515) compared to the average male score of 3.33 (SD=0.616), as noted in Table 4 below.
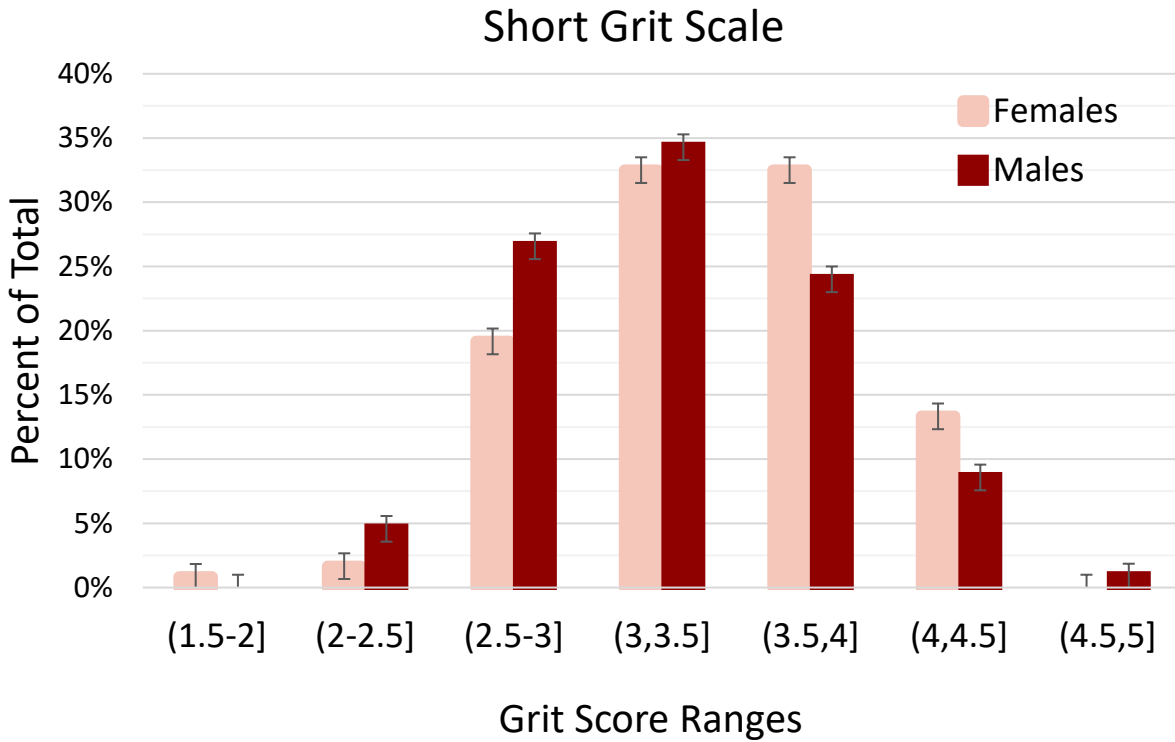
Short Grit Scale

Figure 5. Histogram of grit scale scores for both males and females

Table 4. Mean, Median, and mode of grit scores amongst Males and Females

Grit	Males	Females
Mean	3.33	3.48
Standard Deviation	0.616	0.515
Median	3.375	3.5
Mode	3	3.375
Two-tailed t-test performed		
p-value	0.029	

4. Discussion

The objective of the present study was to collect baseline data into the overall health of first-year engineering students at the University of Arkansas. Preliminary results on first-year engineering students demonstrate low physical activity levels, high levels of poor sleep quality, mental health issues, and above-average grit.

Both groups had over 50% of respondents report they do not perform with moderate or vigorous physical activity any time during the week. Previous research has shown that 62% of college students are insufficiently active (6, 7). Again, the minimum physical activity guidelines for Americans is 30 minutes of moderate activity over 5 days or 15 minutes of vigorous activity of 5 days (10). These preliminary results are a very narrow representation of wholistic physical activity as it is just the activity reported to be done during leisure time. This does not consider activity performed at work, in transportation, housework, and caring for family. External circumstances such as if it were a heavy test week for students when the survey was distributed should be considered in future studies as well. Despite this, it was shown that females participate in leisurely physical activity at a significantly less amount than males do.

It was found that more students were experiencing symptoms of a mental health issue than those that self-reported being diagnosed with one. 91.71% of males and 86.67% reported not being diagnosed with depression, but only 61% and 55% respectively were found to have no symptoms of depression. Similar disparities were found with anxiety, with 89.14% males and 77.5% females not diagnosed but only 66% and 49% symptom-free. There was no difference between gender for depressive symptoms, but there is a significant difference in anxiety and stress. This is in line with previous studies that have found females are more likely to experience anxiety than males (18).

Only 23% of males and 36% of females showed to have symptoms of stress, which varies from previous studies that found 56% of students feel that their stress levels are high or very high (22).

Both males and females were found to be relatively the same on sleep quality and quantity. Approximately 55% of first-year engineers were found to have poor sleep quality, which is close to the previous findings of 60% of college students self-reporting to be poor sleepers (1, 26). However, it is interesting that there is a large variation between self-reported quality sleep and what was found amongst the engineering students. 25% of students seem to think they are getting quality sleep when they are not. Raising awareness of what qualifies as poor sleep will be important for future interventions. Other studies have shown that females were more likely than males to meet the criteria for poor sleep, but it was found there was no difference based on gender in this study (26). During weekdays, neither group's average hours of sleep reach the recommended amount of 7-9 hours a night for the age group (27). This sleep debt is attempted to be accounted for through extra sleep on the weekends but can cause further damage to a healthy sleep schedule. Another factor to be considered in first-year college students' sleep is the environment they sleep in. Dorms can often be noisy and contain many distractions to prevent students from getting enough sleep, despite their best intentions. Lack of sleep results in poorer academic performance as it negatively impacts attention and working memory (28). Increase quantity and improved quality of sleep are needed in first-year engineering students to hopefully improve success in classes.

Female participants had significantly higher average grit than male participants with 3.48 (SD=.515) compared to 3.33 (SD=0.616). The median and mode of female grit scores were also higher than males. Undergraduates with higher grit have been tended to earn higher GPAs than

their peers, so future studies examining student success and retention rates based on gender concerning grit should be performed (4).

The current study suggests that gender plays a role in leisurely physical activity frequency, anxiety, stress, and grit. It was found that there was not a difference between genders in depression, sleep quality, or sleep quantity. This study is an important first step towards better addressing the needs of this on-campus population known to be at risk for negative physical and psychological outcomes. Students that participated this year will also be contacted in future years to re-take the survey so that multiyear tracking and comparisons can be made.

4.1 Future Work

There are many future directions for this work as it is a baseline data set. All the areas discussed in this paper can be subject to future studies on correlation and prevalence amongst engineering students or in comparison to other disciplines. In-person physical and mental assessments are also administered in conjunction with the EIM survey. The results from those assessments were not included in this collection of data as participant levels were low and opportunities for more cut short.

The main focus and the next step for future research will be the relationship between personal health and academic success. Students will be divided into three categories based on their starting math first semester of below level, on level, and above level. Studies examining the relationship between starting math level, personal health, and retention will be performed. Other areas of future work could include human studies on sleep cycle tracking and physical activity diaries, to add physical data to support survey findings.

4.2 Acknowledgements

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Appendix A

Student Health Survey Cover Letter

You are invited to participate in a research study about health of students, faculty and staff on campus at the University of Arkansas.

The purpose of this study is to understand the differences in activity and diet health through an online survey. The survey will take 30-45 minutes to complete. If you are a student, we will also collect your University of Arkansas GPA and retention information through the Office of Student Success.

If you do not want to be in this study, you may refuse to participate. Also, you may refuse to participate at any time during the study. Your job, your grade, your relationship with the University, etc. will not be affected in any way if you refuse to participate.

If you choose to participate and complete the survey, you will be entered into a drawing for one of five $50 cash prizes.

All information will be kept confidential to the extent allowed by applicable State and Federal law and University policy. Only the Investigators and research assistants will have access to your contact information. All the data will be recorded using an identification number and only the Office of Student Success will have access to both your name and student academic information. All data, including contact information and codes, will be stored in a locked room.

At the conclusion of the study you will have the right to request feedback about the results. You may contact the Principal Researcher, Dr. Erin K. Howie, Phone: (479) 575-2910, Email: ekhowie@uark.edu. You will receive a copy of this form for your files.

You have the right to contact the Principal Researcher as listed below for any concerns that you may have. Dr. Erin K. Howie, Phone: (479) 575-2910, Email: ekhowie@uark.edu

You may also contact the University of Arkansas Research Compliance office listed below if you have questions about your rights as a participant, or to discuss any concerns about, or problems with the research.

Ro Windwalker, CIP, Institutional Review Board Coordinator, Research Compliance University of Arkansas, 109 MLKG Building, Fayetteville, AR 72701-1201
479-575-2208, irb@uark.edu

I have read the above statement and have been able to ask questions and express concerns, which have been satisfactorily responded to by the investigator. I understand the purpose of the study as well as the potential benefits and risks that are involved. I understand that participation is voluntary. I understand that significant new findings developed during this research will be shared with the participant. I understand that no rights have been waived by participating.

By proceeding with the survey, you agree to the above.