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Original Article

A Cross-Sectional Institutional Survey of Depression, Suicidal Ideation, and Stigma in Medical Students

Fiona Gruzmark,[1*] Alexis Reinders,[1*] Yanzhi Wang,[2] Ryan Finkenbine.[3]

Abstract

Background: Due to high rates of depression and suicidal ideation among medical students, interventions, such as Pass/Fail grading systems and peer-mentorship, have been implemented, but their effects not reported. The purpose of this study was to explore variations in depression severity among medical students and to better understand the related stigma in healthcare over the past decade, with the aim of enhancing medical education. **Methods:** A cross-sectional survey was conducted on REDCap across students at the University of Illinois College of Medicine. The severity of depression was measured by the PHQ-9. Stigma was assessed utilizing Likert scale responses. Demographics of students who are most likely to experience depression were collected. Additionally, clinical diagnoses of depression, treatment modalities, and alcohol use were compared. **Results:** There were 178 respondents with a 15% response rate. Thirty-nine (22%) respondents were classified in the moderate-to-severe depression group. Thirteen students, all female, endorsed suicidal ideation. A majority of respondents reported that depressed medical students would provide inferior patient care (n=71, 58%), their application to residency would be less competitive (n=76, 54%), they would feel embarrassed (n=88, 61%), and that it would be risky to reveal they have depression on a residency application (n=153, 94%). **Conclusions:** Depression, suicidal ideation, and stigmatization remain prevalent in medical students and may have worsened since 2010. New, multi-faceted approaches such as giving medical students the choice of mental health providers, providing clear information about documentation, and implementing personal, well-being goals are needed to reduce depression and stigma experienced by medical students.

Introduction

The culture of medicine is one of selflessness and invincibility,[1] where physicians dedicate their careers to treating the community. This culture, however, may exact a somber price with astonishingly high rates of mental illness. Medical education represents the first exposure to a challenging professional culture for many physicians where the confluence of academic medicine, accreditation organizations, and collaborative healthcare systems have been described as "indifferent to personal wellness."[2] Suicide is the second leading cause of death in individuals between ages 25 and 34 and the third leading cause of death between ages 15 and 24 in the U.S.[3] The average age of medical students (MSs) is 24,[4] in the highest risk group, at a time when they enter a field with prevalent burnout and suicide.[5] The physician suicide completion rate is almost two times greater than the general public.[5] Although the rate of suicide completion in MSs is less known,[6] they have higher rates of mood and anxiety disorders, as well as suicidal ideation (SI).

One systematic review using 24 cross-sectional studies reported a SI rate of 11% (range of 7% to 24%) in MSs.[7] In addition to fearing stigmatization from authority figures and society,[8] MSs avoid seeking medical attention, preferring to seek support from friends, family, and peers instead.[1] Untreated mental illness not only affects quality of life, but it may also put patients at risk due to decreased quality of care delivery.[5] Mental illness in this cohort contributes to public health concerns, as these are chronic illnesses, with comorbid conditions, that create an economic burden in the U.S.[9]

Stigma, or the feelings of blame and exclusion due to a person's distinct attributes or identification with a group, may be partially responsible for the alarmingly high rates of mental illness in MSs.[1] Students may experience stigmatization in the form of self-stigma, internal feelings of inadequacy, or from the result of socially misplaced external labels garnered from public stigma. In either scenario, little research has been conducted about possible interventions that might reduce stigma in medical education. Medical schools have responded to the mental health crisis with efforts to improve MS well-being during training. Some of these measures include transitioning to a Pass/Fail grading system, more collaborative curriculums, self-care workshops, resilience and mindfulness training, and peer-mentoring, among others.[10] Interestingly, the COVID-19 pandemic seems to have reduced some of the stigma associated with mental illness.[11]

[1] Third-year Medical Student. University of Illinois College of Medicine, Peoria, IL, USA.

[2] PhD. University of Illinois College of Medicine, Peoria, IL, USA.

[3] MD. University of Illinois College of Medicine, Peoria, IL, USA.

* *These authors contributed equally to this work.*

About the Author:. *Fiona Gruzmark and Alexis Reinders are currently third year medical students at the University of Illinois College of Medicine, Peoria, IL, USA, which is a four year program. Notably, both Fiona Gruzmark and Alexis Reinders are members of the Gold Humanism Honor Society.*

Correspondence:

Ryan Finkenbine

Address: 1 Illini Dr, Peoria, IL 61605, USA

Email: ryanf@uic.edu

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Student Editors: Shrinit Babel & Marco Antonio Castañón Gómez
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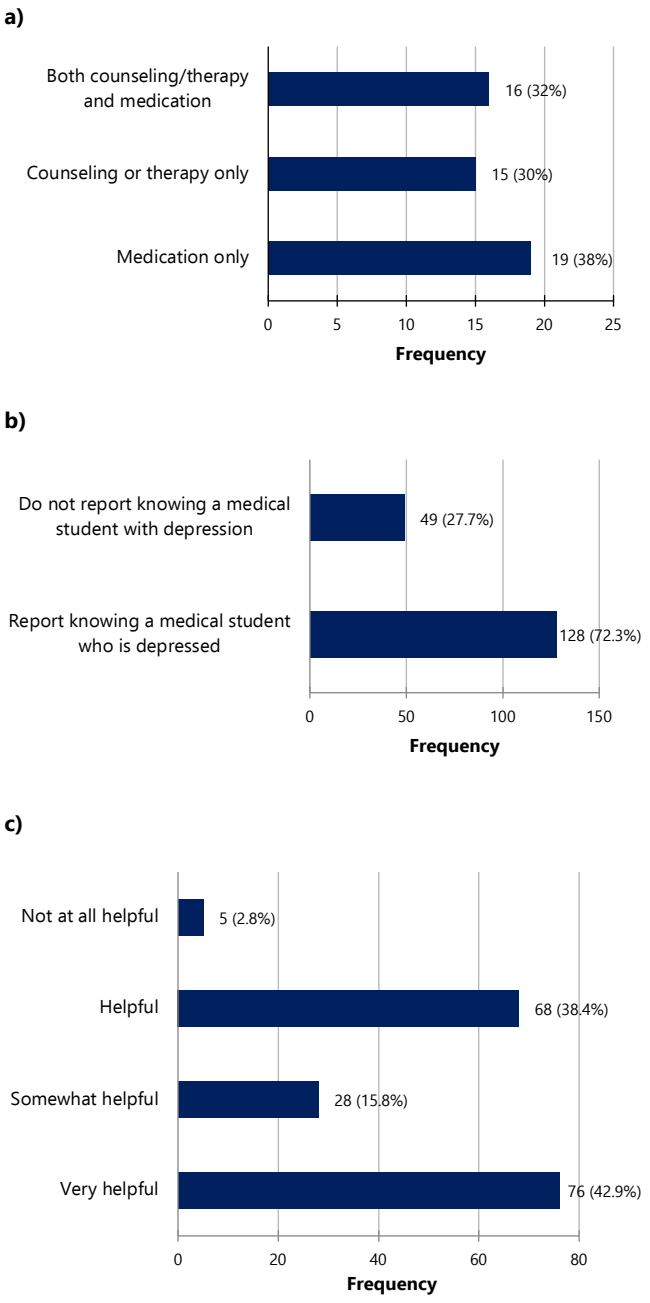
Figure 1. **Reported Types of (a) Treatment for Depression, (b) Impression of Peers' Depression, and (c) Impression of Therapy/Counseling in Medical Students at the University of Illinois College of Medicine.**



Legend: Figure 1a demonstrates that most medical students report not being depressed, and thus, are not receiving any treatment. The most common type of treatment was reported to be medication only (n=19, 10.7%) followed by counseling/therapy only (n=16, 9.0%). Fifteen students (8.5%) reported both taking medication and attending counseling/therapy for depression. Figure 1b illustrates that most students (n=128, 72.3%) reported knowing another medical student with depression. Figure 1c demonstrates most respondents reported that they believe counseling/therapy would be very helpful (n=76, 42.9%) or helpful (n=68, 38.4%) for those who are clinically depressed. Twenty-eight students (15.8%) reported they believe counseling/therapy would be somewhat helpful, and only 5 students reported they did not believe counseling/therapy would be helpful for those who are clinically depressed.

The primary objective of this study was to analyze the rates of depression, SI, and their associated stigma at one institution. Another objective of this study was to identify differences between individuals experiencing various levels of depression based on MS demographics. This study offers an opportunity to suggest additional improvements in medical education to reduce student depression and stigma.

Methods

Study Design and Ethical Approval

The methodology from a 2010 University of Michigan study entitled *Depression, stigma, and suicidal ideation in medical students* served as a template.[12] From February 2023 to November 2023, we conducted a cross-sectional survey (following STROBE protocol) at the University of Illinois College of Medicine's (UICOM) three campuses - Chicago, Peoria, and Rockford. More specifically, the survey was open from February 2nd to November 20th and data analysis was performed in early December 2023. We adapted the previously validated University of Michigan survey and added questions to gather information about gender identity, sexual orientation, and relationship status. Our study was approved by the UICOM Peoria Institutional Review Board ID 1984299-2. Prior to administration, we piloted the survey with three MSs at the Lewis Katz School of Medicine. To maximize the data gathered, we invited all MSs (n = 1186) from the three UICOM campuses to participate in the survey. The study population is a diverse range of students attending UICOM, a large, public, state-supported medical school. We solicited participation by email invitation and class social media channels. We used REDCap to obtain informed consent, complete the survey, and manage data collection. Completion of the survey was voluntary, but a financial lottery was used to recognize participation. Participants interested in being eligible for the lottery voluntarily provided an email, which was blinded to the study, and was only used to cross-check participation and to notify lottery winners. Emails were assigned a number, and three winning numbers were selected using a random number generator. Winners received gift cards of $50, $100, or $300 at the conclusion of the study. The responses to our survey were entirely anonymous, so specific resources could not be provided to high-risk participants. However, we provided all participants with a list of available mental health services on their respective campuses.

Survey Instrument

Our survey consisted of 84 questions/statements, which can be found in the ***Supplementary Material***. We asked general intake questions to identify the demographics of MSs who were most likely to experience depression. Responses were analyzed to detect differences of depression prevalence between classes and race, among others. We used the Patient Health Questionnaire-9 (PHQ-9), a brief, reliable and validated measure, endorsed by the National Institute for Health and Clinical Excellence,[13,14] to assess the severity of depression in participants with the following predetermined, validated cut-off scores: 0-4 for no/minimal

Table 1. **Demographics of Medical Student Respondents at the University of Illinois College of Medicine (n=190).**

Variables	n (%)
Age	
18-20 years	1 (0.5)
21-25 years	100 (52.6)
26-30 years	70 (36.8)
>30 years	19 (10.0)
Sex	
Female	121 (63.7)
Male	69 (36.3)
Gender identity	
Cisgender Female	114 (60.0)
Cisgender Male	65 (34.2)
Non-Binary	6 (3.2)
Transgender Female	1 (0.5)
Other	4 (2.1)
Sexual orientation	
Heterosexual	138 (72.6)
Bisexual	27 (14.2)
Homosexual	12 (6.3)
Race	
Caucasian or White	103 (54.2)
Asian	43 (22.6)
African American or Black	24 (12.6)
Native Hawaiian or Other Pacific Islander	1 (0.5)
Some Other Race	14 (7.4)
Are you of Hispanic or Latino or Spanish Origin?	
No	163 (85.8)
Yes	27 (14.2)
Which religion or belief system do you identify with?	
Christianity	62 (32.6%)
Atheism	29 (15.3%)
Agnosticism	23 (12.1%)
I would prefer not to answer	21 (11.1%)
Agnosticism; Christianity	10 (5.3%)
Islam	8 (4.2%)
Judaism	8 (4.2%)
Other	8 (4.2%)
Relationship status	
Single	86 (45.3)
In a committed relationship/Married	101 (53.1)
Separated/Divorced	3 (1.6)
Children	
None	184 (96.8)
One-Two	6 (3.2)
Is your biological mother or father a physician?	
One is a physician	17 (8.9)
Both are physicians	9 (4.7)
Neither are physicians	164 (86.3)
Which campus do you attend?	
Chicago	90 (47.4)
Peoria	70 (36.8)
Rockford	30 (15.8)
Year in medical school	
M1	73 (38.4)
M2	52 (27.4)
M3	34 (17.9)
M4	31 (16.3)
Intended medical specialty	
Hospital-based discipline (i.e. radiology; pathology, etc.)	24 (12.6)
Medical or pediatric specialty (i.e. pediatric cardiology, etc.)	37 (19.5)
Primary care (i.e; family medicine; internal medicine, etc.)	55 (28.9)
Surgical specialty (i.e. surgery; obstetrics/gynecology, etc.)	37 (19.5)
Undecided	34 (17.9)
Other	3 (1.6)

Table 2. **Likert Scale Responses of Medical Students' Anecdotal Experiences Throughout Medical School (n=190).**

Variables	n (%)
Q16. The stress of medical school depends mostly on my current sequence/rotation	
Strongly disagree	3 (1.6)
Disagree	22 (11.6)
Neither agree nor disagree	41 (21.6)
Agree	96 (50.5)
Strongly agree	28 (14.7)
Q17. My financial situation is a source of significant stress	
Strongly disagree	10 (5.6)
Disagree	29 (16.4)
Neither agree nor disagree	28 (15.8)
Agree	75 (42.4)
Strongly agree	35 (19.8)
Missing	13
Q18. Do you get the help and support you need from your family members and friends	
Strongly disagree	1 (0.6)
Disagree	15 (8.5)
Neither agree nor disagree	16 (9.0)
Agree	77 (43.5)
Strongly agree	68 (38.4)
Missing	13
Q19. Do you get the help and support you need from your fellow medical students	
Strongly disagree	8 (4.5)
Disagree	16 (9.0)
Neither agree nor disagree	39 (22.0)
Agree	81 (45.8)
Strongly agree	33 (18.6)
Missing	13
Q20. Do you get the help and support you need from the University of Illinois Medical School	
Strongly disagree	9 (5.1)
Disagree	41 (23.2)
Neither agree nor disagree	50 (28.2)
Agree	65 (36.7)
Strongly agree	12 (6.8)
Missing	13
Q21. Too much of my happiness has been sacrificed to attend medical school	
Strongly disagree	29 (16.4)
Disagree	63 (35.6)
Neither agree nor disagree	35 (19.8)
Agree	36 (20.3)
Strongly agree	14 (7.9)
Missing	13
Q22. I feel alone	
Strongly disagree	41 (23.2)
Disagree	41 (23.2)
Neither agree nor disagree	33 (18.6)
Agree	46 (26.0)
Strongly agree	16 (9.0)
Missing	13

depression, 5-9 for mild depression, 10-14 for moderate depression, 15-19 for moderately severe depression, and 20-27 for severe depression. We grouped the students into three categories: no/minimal depression (0-4), mild depression (5-9), and moderate-to-severe depression (10-27).

To assess stigma, we used a Likert scale, a common method of measurement in psychology that offers the advantage of

assessing subjective emotions across a continuum.[15] The Likert responses ranged from 1 (very strongly disagree) to 9 (very strongly agree). We asked additional questions to assess clinical diagnoses of depression, treatment modalities, alcohol use, and coping skills. We employed a cross-sectional survey because it is a cost-effective and efficient means of gathering data from a potentially large pool of subjects while allowing for various comparisons and outcomes.

Statistical Analysis

The data was blinded prior to statistical analysis. We calculated frequencies and percentages for all variables of interest. The prevalence of mild and moderate-to-severe depression is reported with 95% confidence intervals. We examined the association between depression severity and SI and respondent characteristics by using a Chi-Square test or exact Chi-square test. We also investigated the association of depression severity and SI by diagnosis and treatment history using a Chi-Square test or exact Chi-square test. Additionally, we compared stigma responses among the three depression severity groups using a Chi-Square test or exact Chi-square test. We used the Bonferroni method as an adjustment for multiple comparisons. We considered results with a P-value of less than 0.05 as statistically significant, except for ***Table 5***, where a P-value less than 0.002 was considered statistically significant. We performed all statistical analyses using SAS software version 9.4 (SAS Institute Inc., Cary, NC, USA).

Results

While percentages and frequencies were collected for all 84 variables of interest, only significant results are reported. Of the 191 responses received, 178 participants (n=178) completed the entire survey, resulting in a participant response rate of 15%. The demographics of participant respondents can be found in ***Table 1***. Notable findings include that most respondents were female, first-year students, and 21-25 years old ***Table 1***. ***Table 2*** illustrates participant opinion data collected on medical school experience. ***Figure 1*** demonstrates medical students' impression of their peers' depression and the effect of counseling. ***Table 3*** displays depression PHQ-9 scores by respondent characteristics. Importantly, there was a statistically significant difference between PHQ-9 scores and self-reported respondent race (95% CI for difference, 6.8-31.4; p = 0.029) ***Table 3***. Also, there was a statistically significant difference between SI in males and females (p = 0.010). Of those who responded, thirteen (7%) students endorsed SI, and 7 (4%) students endorsed having a plan of suicide during medical school. All 13 students who endorsed SI were female.

Table 4 illustrates the rates of diagnosis and treatment for major depressive disorder (MDD) based on PHQ-9 scores. Interestingly, respondents who reported mild depression and have been diagnosed with MDD in the past were more likely than the respondents with moderate-severe depression to receive treatment for their depression in the present (95% CI for difference, -1.9-22.9; p < 0.001) and in the past (95% CI for difference, -5.1-25.1; p = 0.002) ***Table 4***. ***Table 5*** displays a comparison of responses regarding the stigma associated with depression in MSs based on the severity of respondent depression.

***Table 3*. Depression PHQ-9 Scores by Medical Student Demographic Characteristics at the University of Illinois College of Medicine School.**

Variables	Total n=177(%)	None to minimal n=81(%)	Mild n=57(%)	Moderate to severe n=39(%)	P Value	95% CI [a]	
Year in medical school					0.659*		
M1	69 (100)	34 (49.3)	24 (34.8)	11 (15.9)		-5.8	21.0 [b]
M2	49 (100)	22 (44.9)	15 (30.6)	12 (24.5)			
M3	32 (100)	12 (37.5)	12 (37.5)	8 (25.0)			
M4	27 (100)	13 (48.1)	6 (22.2)	8 (29.6)			
Sex					0.105*		
Female	111 (100)	44 (39.6)	40 (36.0)	27 (24.3)		-18.4	6.1
Male	66 (100)	37 (56.1)	17 (25.8)	12 (18.2)			
Race					0.029*+		
African American or Black	21 (100)	8 (38.1)	8 (38.1)	5 (23.8)		6.8	31.4 [c]
Asian	40 (100)	16 (40.0)	12 (30.0)	12 (30.0)			
Caucasian or White	97 (100)	52 (53.6)	32 (33.0)	13 (13.4)			
Some Other Race	19 (100)	5 (26.3)	5 (26.3)	9 (47.4)			
Are you of Hispanic or Latino or Spanish Origin?					0.584*		
No	150 (100)	70 (46.7)	46 (30.7)	34 (22.7)		-20.3	12.0
Yes	27 (100)	11 (40.7)	11 (40.7)	5 (18.5)			
Seriously considered committing suicide					0.007*+		
No	164 (100)	79 (48.2)	53 (32.3)	32 (19.5)		6.6	62.1
Yes	13 (100)	2 (15.4)	4 (30.8)	7 (53.8)			
Considered dropping out of medical school					<0.001*		
No	129 (100)	72 (55.8)	38 (29.5)	19 (14.7)		11.7	42.2
Yes	48 (100)	9 (18.8)	19 (39.6)	20 (41.7)			

Legend: a: 95% CIs for differences in the proportion of moderately or severely depressed individuals between subgroups characterized by the respective row categories, b: Comparison by year in medical school, coded 1 for first or second year and 2 for third or fourth year, c: Results shown for comparison by race, coded 1 for white and 2 for Other. +Exact test, *Chi-square test.

***Table 4*. Rates of Diagnosis and Treatment for Major Depressive Disorder Amongst University of Illinois College of Medicine Students Based on PHQ-9 Scores.**

Variables	Total n=177(%)	None to minimal n=81(%)	Mild n=57(%)	Moderate to severe n=39(%)	P Value	95% CI [a]	
Q33 Have you ever been diagnosed with MDD which is informally referred to as depression?					0.008*		
No	139 (100)	72 (51.8)	39 (28.1)	28 (20.1)		-7.1	24.7
Yes	38 (100)	9 (23.7)	18 (47.4)	11 (28.9)			
Q34 Are you currently diagnosed with MDD/depression?					0.009*		
No	149 (100)	75 (50.3)	46 (30.9)	28 (18.8)		1.4	39.6
Yes	28 (100)	6 (21.4)	11 (39.3)	11 (39.3)			
Q35 Have you ever felt you were seriously depressed even if not diagnosed?					<0.001*		
No	76 (100)	48 (63.2)	17 (22.4)	11 (14.5)		1.5	25.0
Yes	101 (100)	33 (32.7)	40 (39.6)	28 (27.7)			
Q36 Have you sought prior treatment for depression?					<0.001*		
No	98 (100)	62 (63.3)	19 (19.4)	17 (17.3)		-1.9	22.9
Yes	79 (100)	19 (24.1)	38 (48.1)	22 (27.8)			
Q38 Are you currently receiving treatment for depression?					0.002*		
No	133 (100)	71 (53.4)	36 (27.1)	26 (19.5)		-5.1	25.1
Yes	44 (100)	10 (22.7)	21 (47.7)	13 (29.5)			

Legend: a: 95% CIs for the difference in the proportion of moderately or severely depressed individuals between subgroups characterized by the respective row categories, +Exact test, *Chi-square test.

There was a statistically significant difference across the three groups of depression severity with regard to stigma in Q79 (95% CI for difference, 19.17-55.75; p < .001). Hence, people who had higher rates of depression were more likely to agree that those who were depressed were less able to cope ***Table 5***.

Another statistically significant difference was found between respondents who identified as male and female for Q82, "Medical students with depression are dangerous to their patients" (p = 0.01). Respondent males agreed more often (n=7, 14%) than females (n=2, 2%), ***Table 5***.

As shown in the ***Supplementary Material***, participants were offered four options about the state of depression during medical school with "I am not depressed," the most common answer. The other three options were that their depression had become "Better," "Worse," or "Neither better nor worse." Nearly a third (n=56, 32%) of respondents answered that their depression had worsened since the start of medical school. Notably, over half of participants (n=93, 53%) reported alcohol binge drinking in the month before the survey. Binge drinking was defined as greater or equal to four drinks for women and five drinks for men.[16] Forty-three (24%) respondents endorsed binge drinking on more than or equal to three occasions in the prior month.

Discussion

Depression

One significant insight from our study is the overwhelming number of MSs with depression. According to the National Survey on Drug Use and Health, from 2015-2020, the prevalence of depression in the general U.S. population (≥12 years old) is 9% and for those between ages 18 and 25, it is 17%.[17] By comparison, our survey involving mostly participants aged 21 to 25 shows an absolute mild depression rate of 33% and a moderate-to-severe depression rate of 22% ***Table 3***. The much higher rates of depression, possibly caused by stress from intense academic rigor,[18] reported by MSs deserve attention because of potentially serious consequences, such as dropping out, suicide,[2] and suboptimal patient care.[19] Notably, nearly one-third (n=56, 32%) of student participants answered that their depression had worsened after they began medical school. The exact cause for this worsening is unknown, but Cook and Aurora theorized that student mistreatment may play a role. Mistreatment includes racial and gender discrimination, and humiliation, perpetrated by attendings, residents, auxiliary staff, and other MSs.[20] Other contributing causes and associations, such as student personality traits, curricular changes, and changing perceptions of success, have been considered but the results are mixed.[21]

Stigma

Our study offers important insight into MS stigma around depression. Most student respondents reported that depressed MSs would provide inferior treatment (n=71, 58%), their application to residency would be less competitive than their peers (n=76, 54%), they would feel embarrassed/ashamed (n=88, 61%), and that it would be risky to reveal they have depression on a residency application (n=153, 94%). In contrast, 167 (99%) participants disagreed that depression is a sign of personal weakness. That is, while students do not believe that depression is a weakness, they nevertheless view it as a significant barrier. Such contrast between internalized feelings and externalized expectations likely propagates the already established stigma of mental illness in medical schools.[22] The stigma around mental illness remains prevalent in medical schools. The effect of this stigma may discourage students from receiving treatment.[23] According to Suwalska, MSs believed that receiving treatment for depression would be risky and identified self-stigmatization itself as a barrier.[24] Interestingly, 33 (21%) student respondents in our

Table 5. **University of Illinois College of Medicine Students' Likert Scale Responses Regarding Stigma Associated with Mental Health.**

Variables	Total n [c] (%)	None to minimal n (%)	Mild n (%)	Moderate to severe n (%)	P Value[a]	95% CI [b]	
Q58 Telling a counselor I am depressed would be risky.					0.152 *		
Disagree	122 (78.7)	63 (85.1)	34 (70.8)	25 (75.8)		-7.34	26.1
Agree	33 (21.3)	11 (14.9)	14 (29.2)	8 (24.2)			
Q59 My teachers would not ignore me or take me any less seriously if I were depressed.					0.092 *		
Disagree	57 (41.6)	22 (32.4)	20 (50.0)	15 (51.7)		-40.69	1.95
Agree	80 (58.4)	46 (67.6)	20 (50.0)	14 (48.3)			
Q60 Medical students with depression could snap out of it if they wanted to do so.					0.500 * +		
Disagree	168 (98.8)	78 (100.0)	56 (98.2)	34 (97.1)		-2.66	8.38
Agree	2 (1.2)	0 (0.0)	1 (1.8)	1 (2.9)			
Q61 Most people believe that depressed medical students would provide inferior treatment to their patients.					0.348 *		
Disagree	51 (41.8)	23 (45.1)	20 (45.5)	8 (29.6)		-6.51	37.45
Agree	71 (58.2)	28 (54.9)	24 (54.5)	19 (70.4)			
Q62 Other students would stop including me in social activities if they discovered that I was depressed.					0.201 * +		
Disagree	141 (88.7)	70 (90.9)	43 (91.5)	28 (80.0)		-3.82	25.63
Agree	18 (11.3)	7 (9.1)	4 (8.5)	7 (20.0)			
Q63 If I were depressed, I would tell my medical school friends.					0.276 *		
Disagree	69 (46.9)	25 (40.3)	24 (48.0)	20 (57.1)		-37.26	3.62
Agree	78 (53.1)	37 (59.7)	26 (52.0)	15 (42.9)			
Q64 If I were depressed and asked for help, I would be admitting that my coping skills are inadequate.					0.068 *		
Disagree	109 (74.7)	54 (83.1)	30 (63.8)	25 (73.5)		-7.86	26.95
Agree	37 (25.3)	11 (16.9)	17 (36.2)	9 (26.5)			
Q65 If I were depressed, I would worry that I would miss out on educational opportunities.					0.921 *		
Disagree	36 (23.1)	16 (22.5)	12 (22.2)	8 (25.8)		-21.48	14.94
Agree	120 (76.9)	55 (77.5)	42 (77.8)	23 (74.2)			
Q66 Depression is a real medical illness.					0.599 * +		
Disagree	3 (1.7)	2 (2.5)	0 (0.0)	1 (2.6)		-6.09	5.96
Agree	173 (98.3)	78 (97.5)	57 (100.0)	38 (97.4)			
Q67 A medical student who sees a counselor is admitting that he/she is unable to handle the stress of medical school.					0.056 * +		
Disagree	158 (95.8)	75 (98.7)	50 (96.2)	33 (89.2)		-0.83	19.82
Agree	7 (4.2)	1 (1.3)	2 (3.8)	4 (10.8)			
Q68 Medical students with depression are not worth the time and resources for medical school teaching.					0.010 * +		
Disagree	173 (98.3)	80 (100.0)	57 (100.0)	36 (92.3)		-0.67	16.06
Agree	3 (1.7)	0 (0.0)	0 (0.0)	3 (7.7)			
Q69 Most medical students would not want to work with a medical student who is depressed.					0.503 * +		
Disagree	136 (88.9)	62 (88.6)	48 (92.3)	26 (83.9)		-10.24	19.64
Agree	17 (11.1)	8 (11.4)	4 (7.7)	5 (16.1)			
Q70 If I were depressed and applying to a residency, my application would be less competitive than that of a student who does not have depression.					0.033 *		
Disagree	66 (46.5)	36 (52.9)	22 (51.2)	8 (25.8)		7.69	46.58
Agree	76 (53.5)	32 (47.1)	21 (48.8)	23 (74.2)			
Q71 If I were depressed, I would not feel embarrassed or ashamed.					0.380 *		

Disagree	88 (61.1)	38 (60.3)	32 (68.1)	18 (52.9)		-13.3	28.05
Agree	56 (38.9)	25 (39.7)	15 (31.9)	16 (47.1)			
Q72 If I were depressed, I would worry that my medical student friends who knew would tell other students or faculty.					0.042 *		
Disagree	105 (68.2)	54 (77.1)	33 (66.0)	18 (52.9)		4.75	43.65
Agree	49 (31.8)	16 (22.9)	17 (34.0)	16 (47.1)			
Q73 Depression is a sign of personal weakness.					0.047 * +		
Disagree	167 (98.8)	77 (100.0)	55 (100.0)	35 (94.6)		-1.88	12.69
Agree	2 (1.2)	0 (0.0)	0 (0.0)	2 (5.4)			
Q74 Medical students with depression are NOT to blame for their problems.					0.286 * +		
Disagree	7 (4.5)	3 (4.4)	4 (7.4)	0 (0.0)		-0.47	9.29
Agree	148 (95.5)	65 (95.6)	50 (92.6)	33 (100.0)			
Q75 A depressed medical student is worth the investment of medical school teaching time and effort.					0.702 * +		
Disagree	2 (1.2)	1 (1.3)	0 (0.0)	1 (2.6)		-7.02	4.35
Agree	170 (98.8)	76 (98.7)	57 (100.0)	37 (97.4)			
Q76 Medical students and faculty members believe that a student who has depression is just as intelligent as other students.					0.022 * +		
Disagree	16 (11.3)	5 (7.4)	3 (7.1)	8 (25.0)		-33.88	-1.41
Agree	126 (88.7)	63 (92.6)	39 (92.9)	24 (75.0)			
Q77 If I were depressed it would be risky to reveal my depression on my residency application.					0.905 * +		
Disagree	9 (5.6)	5 (6.8)	2 (3.8)	2 (5.6)		-8.17	10.76
Agree	153 (94.4)	68 (93.2)	51 (96.2)	34 (94.4)			
Q78 If I were depressed, I would seek treatment.					0.181 * +		
Disagree	15 (10.6)	4 (5.9)	6 (12.8)	5 (18.5)		-28.32	3.05
Agree	127 (89.4)	64 (94.1)	41 (87.2)	22 (81.5)			
Q79 If I were depressed, I would be blamed for being unable to cope.					<.001 *		
Disagree	111 (75.5)	56 (88.9)	37 (75.5)	18 (51.4)		19.17	55.75
Agree	36 (24.5)	7 (11.1)	12 (24.5)	17 (48.6)			
Q80 Seeking help for depression would make me feel less intelligent as a medical student.					0.082 *		
Disagree	125 (79.6)	61 (84.7)	40 (81.6)	24 (66.7)		0.56	35.55
Agree	32 (20.4)	11 (15.3)	9 (18.4)	12 (33.3)			
Q81 Other students and faculty members would view me as unable to handle my responsibilities if I were depressed.					0.067 *		
Disagree	86 (59.7)	45 (68.2)	26 (59.1)	15 (44.1)		3.94	44.18
Agree	58 (40.3)	21 (31.8)	18 (40.9)	19 (55.9)			
Q82 Medical students with depression are dangerous to their patients.					0.148 * +		
Disagree	138 (93.9)	59 (89.4)	50 (98.0)	29 (96.7)		-17.09	2.55
Agree	9 (6.1)	7 (10.6)	1 (2.0)	1 (3.3)			
Q83 If I were depressed, I would be unable to complete medical school tasks and responsibilities as					0.456 *		
Disagree	57 (38.8)	22 (34.4)	22 (45.8)	13 (37.1)		-22.56	17.02
Agree	90 (61.2)	42 (65.6)	26 (54.2)	22 (62.9)			
Q84 If I were depressed, fellow medical students would respect my opinions less.					0.013 * +		
Disagree	124 (85.5)	59 (90.8)	42 (89.4)	23 (69.7)		3.89	38.26
Agree	21 (14.5)	6 (9.2)	5 (10.6)	10 (30.3)			

Legend: a: Significant using the Bonferroni adjustment for multiple comparisons (P < .002), b: 95% CIs for difference in the rate of agreement between moderately or severely depressed and no or minimally depressed individuals, c: Responses of "strongly agree" and "agree" were recoded as "agree," and responses of "strongly disagree" and "disagree" were recoded as "disagree." Responses of "neither disagree nor agree" were excluded from the analysis, +Exact test, *Chi-square test

study reported that telling a counselor they are depressed would be risky, similar to the 22% of student respondents in the Michigan study.[12] Moreover, while 101 (57%) student respondents reported that they have felt seriously depressed in

the past, only 79 (44%) student participants have sought prior treatment, even when 82% reported that treatment for depression would be either helpful or very helpful (***Figure 1***). This supports the aforementioned disparity of treatment of mental illness in MSs. A corollary involves reduced quality of care in the context of stigma about mental illness.[25] One study assessed why MSs were undertreated for their depression. The reasons included lack of time, inadequate resources, fear of negative impact on career, fear that treatment would be noted in their academic record, and fear that treatment would not help.[26]

Comparison to Previous Studies

The absolute rate of depression, SI, and stigma in UICOM's MS population echoes the findings of other studies, including the Michigan study, which found that 14% of respondents had moderate-to-severe depression, and 22 (4%) respondents reported SI.[12] In our study, 39 (22%) student respondents had moderate-to-severe depression, and 13 (7%) reported SI. These findings suggest that well-intended efforts to reduce depression and SI in MSs may be less successful than hoped. For example, in efforts to address student well-being, UICOM employs a Pass/Fail grading system during the first two years, offers an integrated curriculum with workshops about mindfulness training, peer-mentoring, and self-care, and shifted from lecture-based to collaborative learning in 2017.[9,19] Nair et al. discuss that tools learned through such programs and workshops are insufficient. She proposes systemwide changes that enhance efficiency and balanced workloads, thereby preventing "moral injury."[18]

A comparison of the overall SI rate in our and the University of Michigan study shows similar rates. The two studies are more than a decade apart, so the persistence of such high rates is concerning. However, direct comparisons of the results must be approached with caution as several covariates and confounding variables cannot be accounted for between two different institutions at two different times. Suicide risk factors in the medical student environment include both static and dynamic risk factors.[27] Yet, efforts to reduce depression, as noted, may not be as effective as intended. An additional stressor might be the COVID-19 pandemic. It is well known that the pandemic had a negative effect on the general population's mental health, but the impact was even greater on MSs.[28] A meta-analysis of 201 studies demonstrated that during the pandemic, the prevalence of depression and SI was reported to be 41% and 15%, respectively; 81 of the studies showed a high moderate-severe depression prevalence of 27%.[28] COVID-19 is likely to have had lasting negative effects on mental illness and may explain why MS SI rates have remained persistently high.

Coping Mechanisms

Our study revealed another important finding – MSs reported an unhealthy coping mechanism, binge drinking, at high rates. Numerous studies report greater rates of binge drinking among MSs compared to the general population.[29,30] We report that 93 (53%) participants reporting binge drinking within a month of taking the survey. Binge drinking may be linked with depression, although which is causative of the other is uncertain.[30] Other reasons MSs have higher rates of binge drinking may include stress from academic pressure, social issues, and financial problems.[30–32]

Efforts to Reduce Depression

Although prior efforts to reduce the rate and severity of MS depression have had mixed results, the need remains. According to Moir et al., student participation in the creation and implementation of exercises such as self-care diaries, well-being goals, and reflective writing may be necessary to be effective. Other suggestions include the use of mindfulness, self-management, and self-awareness strategies that may help MSs with high emotional intelligence. Moir's group also suggests giving students a choice of mental health providers or services and open transparency in the documentation.[33] Resilience leads to lower rates of burnout, so this, too, should be promoted in MSs while recognizing that internal coping mechanisms alone may be inadequate.[18] Ways to enhance resilience in MSs include employing a variety of self-care practices.[34] Some academic institutions have implemented psychoeducation and contact-based interventions to reduce the stigma associated with mental illness. Policy-maker involvement may also help combat stigma in academic institutions.[34,35]

Limitations and Future Directions

Our study offers information about MS depression, stigma, and coping mechanisms, among other data. Our cross-sectional study does come with the toll of the reduced ability to make causal inferences, susceptibility of report, sampling, and other biases, and the limitations in determining trends, among others. The use of a survey inevitably introduces bias, including the potential for response bias, non-response bias, selection bias, confirmation bias, social desirability bias, and sampling bias. To mitigate these unavoidable biases, we omitted or reframed questions that were leading, loaded, absolute, or unclear. Additionally, the effect of depression on the study cohort is unknown. Some of the potential participants may have been unmotivated to participate due to depressive symptoms, whereas others may have felt compelled to volunteer for the study to combat their own depression or others.' An additional limitation of the cross-sectional study design is its inability to capture longitudinal changes over time or indicate causality. Another limitation is the small 15% response rate, although this is not too different from other MS survey rates and the absolute sample size is relatively large (n=178). Because the pool of potential participants was drawn from a single institution, the data is not likely to be generalizable to other academic centers, which adds additional bias. Since the students represented three distinct campuses, however, may mitigate this limitation.

Further studies are needed to confirm our results. There are two data sets from two samples more than a decade apart, both of which raise concerns about MS depression and the stigma around mental illness. Future studies should continue to assess trends while gathering data about effective interventions for improving MS well-being. Other studies should assess how different medical

school interventions, such as offering medical students the choice of mental health providers, providing clear information about expectations, managing relationships, promoting resilience and help-seeking, and implementing personal well-being goals, among others, are effective in improving the medical school experience.[33]

Final Thoughts

Depression, SI, and their stigmatization remain prevalent in the MS population. New, effective approaches are needed to reduce this prevalence, especially because current methods may be less impactful than presumed. Reduction of stigma, specifically, may promote greater access to mental health resources, including preventative measures, that would, in turn, reduce the prevalence and severity of depression and its negative sequelae.

Disclosures

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Summary – Accelerating Translation

A cross-sectional institutional survey of depression, suicidal ideation and stigma in medical students

Depression and suicidal ideation (SI) are not only serious threats to public health in the general population, but they also remain very prevalent in the Medical Student (MS) body. The aim of our study is to identify differences in depression and suicide among MSs of different demographics and to better understand the stigma associated with mental illness among MSs. In addition, we comment on whether changes to the MS curriculum have improved MS well-being in the last decade.

A survey of MSs was conducted in 2023 at three University of Illinois College of Medicine campuses. There were 178 respondents. The survey integrated the PHQ-9, a validated measure of depression severity. Data was also gathered about suicidal ideation, stigma and perception of mental illness, demographics, clinical diagnoses, treatment, and alcohol use.

The survey results show that 22% of MS respondents were in the moderate-to-severe depression group and 13, all female, endorsed SI. A majority of students reported that depressed MSs would provide inferior treatment to their patients, their application to residency would be less competitive than their peers if they were depressed, they would feel embarrassed or ashamed if they were depressed, and that it would be risky to reveal they have depression on a residency application. In addition, MSs with higher levels of depression were more likely to agree with the statement that a depressed MS would be blamed for being unable to cope. Although it is uncertain whether depression, SI, and stigmatization have worsened since 2010, the high prevalence in MSs supports the need for new, multi-faceted approaches to address them.

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Author Contributions

Conceptualization: FG, AR, RF. Data Curation: FG, AR, YW, RF. Formal Analysis: YW. Funding Acquisition: AR. Investigation: FG, AR, RF. Methodology: FG, AR, YW, RF. Supervision: RF. Writing - Original Draft: FG, AR. Writing - Review Editing: FG, AR, RF.

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Supplementary Material

GENERAL INTAKE QUESTIONS: These questions will be used to assess if there are differences in perceptions of mental health depending on differences in demographics.

1) What is your email address?

*Please note this will only be used to contact you if you win the prize.

*If you click "Choose not to Answer" you will be unable to win the prize.

2) How old are you?

a. 18-20 years
b. 21-25 years
c. 26-30 years
d. 31-35 years
e. Greater than 35 years

3) What is your biological sex?

a. Female
b. Male

4) What is your gender identity?

a. Cisgender Female
b. Cisgender Male
c. Transgender Female
d. Transgender Male
e. Non-Binary
f. Other (please specify)
g. I would prefer not to answer

5) What is your sexual orientation?

a. Asexual
b. Bisexual
c. Heterosexual
d. Homosexual
e. Pansexual
f. Other (please specify)
g. I would prefer not to answer

6) What is your race? (Select all that apply.)

a. African American or Black
b. Alaska Native/American Indian
c. Asian
d. Caucasian or White
e. Native Hawaiian or Other Pacific Islander
f. Some Other Race

7) Are you of Hispanic or Latino or Spanish Origin?

a. Yes
b. No

8) Which of the following religions/belief systems/beliefs do you identify with?

a. Agnosticism
b. Atheism
c. Buddhism
d. Christianity
e. Hinduism
f. Islam
g. Judaism
h. Sikhism
i. Other (please specify)
j. I would prefer not to answer

9) How would you characterize your relationship status currently?

a. Single
b. In a committed relationship
c. Married
d. Divorced
e. Widowed
f. Separated

10) If you are currently single, (including previously divorced, widowed, and separated individuals) do you feel like medical school has impeded your ability to be in a relationship?

a. Yes
b. No
c. I am in a relationship

11) How many children do you have?

a. None
b. One
c. Two or More

12) Is your biological mother or father a physician?

a. Yes, one is a physician
b. Yes, both are physicians
c. No, neither are physicians

13) Which campus do you attend?

a. Chicago
b. Peoria
c. Rockford

14) In what year of medical school are you?

a. M1
b. M2
c. M3
d. M4

15) What is your intended medical specialty?

a. Primary care (i.e, family medicine, general internal medicine, general pediatrics)
b. Surgical specialty (i.e. general surgery, obstetrics/gynecology, urology)
c. Medical or pediatric specialty (i.e. pediatric cardiology, adult gastroenterology, neurology)
d. Hospital-based discipline (i.e. radiology, pathology, anesthesiology, emergency medicine)
e. Undecided
f. Other (please specify)

16) The stress of medical school depends mostly on my current sequence/rotation.

a. Strongly disagree
b. Disagree
c. Neither agree nor disagree
d. Agree
e. Strongly agree

QUESTIONS REGARDING OPINIONS ON MEDICAL SCHOOL EXPERIENCE: These questions will be used to assess medical students' feelings on their experiences in school and how it has affected them.

17) My financial situation is a source of significant stress.
a. Strongly disagree
b. Disagree
c. Neither agree nor disagree
d. Agree
e. Strongly agree
18) In thinking about all types of help and support for medical school (i.e. emotional, financial), do you get the help and support you need from your FAMILY MEMBERS AND FRIENDS?
a. Strongly disagree
b. Disagree
c. Neither agree nor disagree
d. Agree
e. Strongly agree
19) In thinking about all types of help and support for medical school (i.e. emotional, financial), do you get the help and support you need from your FELLOW MEDICAL STUDENTS?
a. Strongly disagree
b. Disagree
c. Neither agree nor disagree
d. Agree
e. Strongly agree
20) In thinking about all types of help and support for medical school, do you get the help and support you need from the UNIVERSITY OF ILLINOIS MEDICAL SCHOOL?
a. Strongly disagree
b. Disagree
c. Neither agree nor disagree
d. Agree
e. Strongly agree
21) Too much of my happiness has been sacrificed to attend medical school.
a. Strongly disagree
b. Disagree
c. Neither agree nor disagree
d. Agree
e. Strongly agree
22) I feel alone.
a. Strongly disagree
b. Disagree
c. Neither agree nor disagree
d. Agree
e. Strongly agree

23-32) Over the last 2 WEEKS, how often have you been bothered by any of the following problems?
0 = not at all 1= several days 2= more than half the days 3= nearly every day
23) Little interest or pleasure in doing things.
24) Feeling down, depressed, or hopeless.
25) Trouble falling or staying asleep, or sleeping too much.
26) Feeling tired or having little energy.
27) Poor appetite or overeating.
28) Feeling bad about yourself—or that you are a failure or have let yourself or your family down.
29) Trouble concentrating on things, such as reading the newspaper or watching television.
30) Moving or speaking so slowly that other people could have noticed. Or the opposite—being so fidgety or restless that you have been moving around a lot more than usual.
31) Thoughts that you would be better off dead, or of hurting yourself in some way.
32) How difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?
a. Not difficult at all
b. Somewhat difficult
c. Very Difficult
d. Extremely Difficult
33) Have you ever been diagnosed with Major Depressive Disorder (MDD) which is informally referred to as depression?
a. Yes
b. No
34) Are you currently diagnosed with MDD/depression?
a. Yes
b. No
35) Have you ever felt you were seriously depressed even if not diagnosed?
a. Yes
b. No
36) Have you sought prior treatment for depression?
a. Yes
b. No
37) What type of treatment?
a. Counseling or therapy only
b. Medication only
c. Both counseling/therapy and medication
d. Other treatment
e. N/A
38) Are you currently receiving treatment for depression?
a. Yes
b. No
39) What type of treatment are you currently receiving?
a. Counseling or therapy only
b. Medication only
c. Both counseling/therapy and medication
d. Other treatment
e. I am not depressed and am not receiving any treatment
40) Since enrolling in medical school has your depression been?
a. Better
b. Worse
c. Neither better nor worse
d. I am not depressed
41) Since enrolling in medical school, have you ever seriously considered committing suicide?
a. Yes
b. No
42) Since enrolling in medical school, have you ever made a plan on how you would commit suicide?
c. Yes
d. No
43) Do you know any medical students who are depressed?
a. Yes
b. No

44) Do you know any medical students whose education, training, or advancement has suffered because of their depression?
a. Yes
b. No
45) Have you considered dropping out of medical school?
a. Yes
b. No
46) Over the past month, how STRONGLY have you considered dropping out of medical school?
a. I have not considered dropping out of medical school
b. Not at all strongly
c. Somewhat strongly
d. Strongly
e. Very strongly
47) What are your main reasons for considering dropping out of medical school? (Select all that apply.)
a. I have not considered dropping out of medical school.
b. I am unhappy
c. I am too stressed
d. I do not feel academically prepared
e. I am too homesick
f. I no longer have time to do the things I enjoyed
g. My depression has gotten too severe
h. It seems like there is no end in sight/It seems as if it will never get better
i. I want to do something besides become a physician
j. Other (please specify)
k. I don't know
48) If you have considered dropping out of medical school before, what were your main reasons for NOT dropping out? (Select all that apply.)
l. I have not considered dropping out of medical school.
m. I would be more unhappy if I dropped out
n. I would be more stressed if I dropped out
o. There are no jobs I could get with my undergraduate degree
p. My family would be disappointed in me
q. I would be too ashamed
r. I would feel like a failure
s. I would be too in debt
t. I know it will get better after medical school itself (ie. in residency or as am attending physician)
u. Other (please specify)
v. I don't know
49) Knowing what you know now, would you choose to attend medical school again if you had the chance?
a. Yes
b. Probably
c. Probably Not
d. No
50) How would you rate the level of academic competitiveness at your medical school?
a. Not at all competitive
b. Somewhat competitive
c. Competitive
d. Very Competitive
e. Extremely competitive
51) Relative to the average person in my class, my overall academic performance is
a. Far below average
b. Somewhat below average
c. Average
d. Somewhat above average
e. Far above average
52) How helpful on average do you think THERAPY or COUNSELING is, when provided competently, for medical students who are clinically depressed?
a. Not at all helpful
b. Somewhat helpful
c. Helpful
d. Very helpful
53) How helpful on average do you think MEDICATION is, when appropriately prescribed, for medical students who are clinically depressed?
a. Not at all helpful
b. Somewhat helpful
c. Helpful
d. Very helpful
54) Do you believe that depression develops in medical students due to…?
a. Inability to cope, either with the stress of medical school or with other issues
b. Neurotransmitter abnormality or Imbalance
c. Illness or other medical problems
d. Substance Use
e. A combination of two or more of these
f. None of these
55) When you are stressed or depressed, what methods do you use for coping? (Select all that apply)
a. Exercise more
b. Smoke more cigarettes/tobacco
c. Physically harm yourself
d. Contact therapist/counselor
e. Eat less than usual
f. Eat more than usual
g. Talk to or spend more time with friends
h. Seek support from my church or spiritual advisor (i.e. pastor, minister)
i. Talk to or spend more time with family members
j. Study more
k. Use recreational drugs
l. Drink more alcohol
m. Take a break from Peoria, Chicago, or Rockford (i.e. leave the city)
n. Isolate yourself
o. Other (please specify)
p. None of the above

56) Over the past month, about how many HOURS PER WEEK did you spend exercising? (Include any exercise of moderate or higher intensity, where "moderate" intensity would be roughly equivalent to brisk walking or bicycling)
a. Zero
b. Less than 1
c. 1-2
d. 3-4
e. 5 or more
57) Over the past month, on how many occasions have you had 4 (for women) or 5 (for men) ALCOHOLIC DRINKS at one sitting?
a. None
b. Once
c. Twice
d. 3 to 5 times
e. 6 to 9 times
f. 10 or more times
g. Don't know
h. I refuse to answer

The following statements address your beliefs about depression. Please respond to each item according to how much you agree or disagree.
59-85) To what extent do you agree or disagree that… ?
a. Strongly Disagree
b. Disagree
c. Neither Disagree nor Agree
d. Agree
e. Strongly Agree
58) Telling a counselor I am depressed would be risky.
59) My teachers would not ignore me or take me any less seriously if I were depressed.
60) Medical students with depression could snap out of it if they wanted to do so.
61) Most people believe that depressed medical students would provide inferior treatment to their patients.
62) Other students would stop including me in social activities if they discovered that I was depressed.
63) If I were depressed, I would tell my medical school friends.
64) If I were depressed and asked for help, I would be admitting that my coping skills are inadequate.
65) If I were depressed, I would worry that I would miss out on educational opportunities.
66) Depression is a real medical illness.
67) A medical student who sees a counselor is admitting that he/she is unable to handle the stress of medical school.
68) Medical students with depression are not worth the time and resources for medical school teaching.
69) Most medical students would not want to work with a medical student who is depressed.
70) If I were depressed and applying to a residency, my application would be less competitive than that of a student who does not have depression.
71) If I were depressed, I would not feel embarrassed or ashamed.
72) If I were depressed, I would worry that my medical student friends who knew would tell other students or faculty.
73) Depression is a sign of personal weakness.
74) Medical students with depression are NOT to blame for their problems.
75) A depressed medical student is worth the investment of medical school teaching time and effort.
76) Medical students and faculty members believe that a student who has depression is just as intelligent as other students.
77) If I were depressed it would be risky to reveal my depression on my residency application.
78) If I were depressed, I would seek treatment.
79) If I were depressed, I would be blamed for being unable to cope.
80) Seeking help for depression would make me feel less intelligent as a medical student.
81) Other students and faculty members would view me as unable to handle my responsibilities if I were depressed.
82) Medical students with depression are dangerous to their patients.
83) If I were depressed, I would be unable to complete medical school tasks and responsibilities as well as other students.
84) If I were depressed, fellow medical students would respect my opinions less.