ORIGINAL ARTICLE

Depression, Anxiety, and Stress among Students in Newly Established Remote University Campus in Indonesia

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ABSTRACT

Introduction: Studies show that many university students experience common mental health problems, such as depression, anxiety, and stress. In severe cases, these problems can cause disability that may hinder youths from achieving their potential academic or career development. This study aims to measure the occurrence and levels of depression, anxiety, and stress and their determinants among undergraduate students of a recently established remote campus in Indonesia. **Methods:** This cross-sectional study was conducted in Banyuwangi, East Java from September- December 2017. Exactly 229 students were randomly selected using cluster sampling. Mental health status was measured using Depression, Anxiety, and Stress Scale. We used multivariable logistic regression to determine factors related to depression, anxiety, and stress. **Results:** The prevalence of depression, anxiety, and stress were 25.0%, 51.1%, and 38.9% respectively among these students. Level of education was associated with depression and stress, but not with anxiety. The fifth semester students had significantly greater odds of depression (AOR = 2.27; 95% CI: 1.04-4.93; p value = 0.04) and stress (AOR =2.18; 95% CI: 1.10-4.37; p value = 0.03) compared to the seventh semester students. No variables were significantly associated with the occurrence of anxiety. **Conclusion:** Fifth semester students had a greater risk for depression, anxiety, and stress compared to students at a higher level of education. The present study highlights the need for policies in new universities to provide a routine psychological support and counseling for students undergoing semesters that place greater mental burden.

Keywords: Depression, Anxiety, Stress, Student, University

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INTRODUCTION

The prevalence and severity of psychological health problems, their symptoms and mental health issues have increased in the last decade (1). Globally, about 300 million people are affected by depression (2), and 264 million are affected by anxiety (3). People affected by mental health problems experience higher levels of disability and mortality (4, 5). Every year nearly 800,000 people commit suicide and more people self-harm.

Suicide can occur at any age and is the second leading cause of death at the age of 15-29 years (6). People with severe depression are more likely to attempt suicide but suicide ideation are also experienced by students with mild and moderate symptoms of depression (7). Other than suicide (7, 8), stress, anxiety and depression have a serious social and economic impact such as increased risk of school dropouts (9), having bad relationships, having marital problems (10-12), and inability to work effectively(12).

Studies showed that mental health disorders generally occur in early adolescence and adolescence period (13). The various changes occurring in adolescents put them under great pressure, which may have adverse consequences, not only physically but also psychologically (14). A study conducted on 7915 students in Hong Kong found that 21%, 41% and 27% of students had depression, anxiety and stress respectively (15). A research conducted in Malaysia found that 27.5% and 9.7% of students had moderate and severe depression respectively, 34% and 29% of

students had moderate and severe anxiety, while only 18.6% and 5.1% of students had moderate and severe stress (16). Another study conducted in Kolkata, India showed that the prevalence of stress was 91.1% among medical students (17).

Stress is the biggest obstacle to academic performance (18). Almost 60% of university students in Uganda drop out due to depression, anxiety, and disability (9). A study conducted on medical students in Kolkata, India shows that the cause of stress was mostly academic in nature (94.9%) ie: language barriers, and changes in teaching method (17). The higher the academic level, the more burden the students endure (18) including of balancing college, personal and work life, preparing for exams, facing various exams, and facing social, financial, relationship, family, and extra-curricular pressures (21) (22) (23). Common mental health disorders among students are also associated with social, demographic, behavioral, and educational factors (24, 25).

Several studies indicates that the mechanisms of inflammation and dysregulation of hormonal stress systems influenced by body mass index can worsen mental health status (26). The psychological effects related to self-image, bullying, or body shaming can lead to depression among college students, especially for girls (27-29). Overweight or obese students are more likely to have lower self-esteem and lower satisfaction in their body (30) leading to depression.

Indonesia is currently developing more higher education institutions in remote areas in Indonesia in collaboration with highly accredited universities and local governments in order to improve the opportunities for Indonesians in remote areas to have higher educations. In the beginning of its development, these new institutions need to build infrastructures and establish management systems and the difficulties it entails may affect students' academic performance or cause the feeling of uncertainties of the students' futures. In addition, these developing campuses may not already have psychological supports for students, thus students may experience prolonged untreated mental distress that may cause harm. It is therefore important to understand the common mental health status of students in these new institutions and its determinants. This study, thus aims to assess the status and examining risk factors associated with depression, anxiety, and stress in students of Universitas Airlangga, Banyuwangi Campus, a newly established remote campus in East Java.

MATERIALS AND METHODS

This is a cross-sectional study conducted at Universitas Airlangga, Banyuwangi campus between September-November 2017. The campus was established in 2014 and only had four study programs: Veterinary, Public Health, Aquaculture, and Accounting. Each study

programs only enrolled one batch of students per year. At the time of the study the campus had not had any alumni. The study was conducted with permission from Banyuwangi National Unity and Politics Board. Ethical permission was approved by the Ethical Committee of the Faculty of Public Health, Universitas Airlangga in Surabaya.

The study population was all registered students of the first, second and third year of Veterinary, Public Health, Aquaculture, and Accounting in Banyuwangi campus. The inclusion criteria were enrolled students who were at semester 3, 5 and 7. We recruited 229 students, which was more than the minimum sample size (120 samples) to achieve a 95% confidence interval, 80% power and an addition of 25% for possible rejection calculated using the Lemeshow et al., 1990 (31). Sampling was done by cluster sampling system with each academic year as a cluster. Participating students were randomly selected using a simple random sampling from a list of registered students in each study program by academic year.

The selected students were invited to an on-campus testing and informed consent process was conducted prior to testing. Consented students were given self-administered questionnaire and four trained enumerators were available during testing to clarify questions when necessary. The questionnaire had been tested for its validity and reliability on September 7, 2017 at the first grade of Aquaculture Study Program of Universitas Airlangga, Banyuwangi campus, resulting in a Cronbach's alpha of 0.94.

Depression, anxiety, and stress were measured using DASS 42 questionnaire(32). There are 42 questions in DASS 42 of which students need to answer using a score of 0 = neither suits me at all, nor ever, 1 = suits me to some extent, or sometimes, 2 = corresponds to me to the extent to which it can be considered, or quite often, 3 = very much in line with me, or very often. The maximum total score of DASS 42 is 42 in each of the three scales (depression, anxiety, and stress). A lower score means a better score. For each scale the state of mental condition was categorized into normal or experiencing psychological disorder (mild, moderate, severe, and extremely severe) (Table I).

The determinants to be analysed in this study included demographic variables (age, sex, residence status),

Table I: Category of Depression, anxiety, and stress

	Normal	Mild	Moderate	Severe	Extremely Severe
Depression	0-9	10-13	14-20	21-27	28+
Anxiety	0-7	8-9	10-14	15-19	20+
Stress	0-14	15-18	19-25	26-33	34+

Lovibond, S.H.&Lovibond, P.F. (1995)

academic variables (study program, academic year, and Grade Point Average (GPA)), socioeconomic status, nutritional status (body mass index (BMI)), hip to waist ratio, and smoking status.

The socio-economic variables are measured by a modified Fahmy and El-Sherbini Social Score (33) which included five domains: education and culture (maximum score =30), family (maximum score = 4), occupation (maximum score =10), household ownership (maximum score = 12), and sanitation (maximum score = 9). Education and cultural domain consisted of father or mother's education (unable to read, able to read and write, primary school, junior high school, senior high school, vocational, graduate, and post bachelor) and access to health information (get access through print or electronic media or both). Family domain consisted of residence status (urban and rural) and number of family members (≥ 5 members and <5 members). Occupation domain consisted of father's or mother's occupation (not working, non-skilled unskilled workers, skilled rough workers, traders/entrepreneurs, semiprofessional, professional). Household ownership included ownership of refrigerator, radio, television, washing machine, phone/mobile phone, car, rice field/garden, shop/ animal cage, other than used house, farm animals, and computer. Sanitation included the availability of clean water, electricity, latrine, air conditioning, number of rooms at home(no place to live, rent <4 space, rent ≥4 space, own property <4 space, own property≥ 4), and house density index (≤1 person per room, > 1 person per room).

The respondent's nutritional status was measured in body mass index (kg/m2) and hip to waist ratio. Weight and height were measured using a Seca scale and stature meter (703 & 220). Waist circumference and hip circumference were measured using a Medline measuring tape.

Data were analyzed using multivariable logistic regression. Factors with a p-value of <0.25 in univariable analysis were included in the multivariable analysis. In the final model, those that were insignificantly associated with depression, anxiety and stress were excluded from the model using Backward method. To test for confounding variables, all confounding candidates were incorporated into the model. A variable was considered a confounder if when included in the multivariable model it changed by ≥ 10% the odds ratio estimate of any other variables in the model. All confounders were kept in the final model.

RESULTS

There were 240 respondents who were invited to participate in this study. Only 235 respondents came to the testing location and agreed to participate in the study, of which 229 respondents had complete information

on the outcome and covariates. The mean age of respondents was 20.2 ± 1.4 years with a mean GPA score of 3.3 ± 0.3. Most respondents were female (77.7%) and did not live with their families (74.7%). Students who participated in the study were evenly distributed from all four study programs but the seventh semester students had the highest participation rate (35.8%). The mean BMI was 22.0 ± 4.2 kg/m2 and the mean hip to waist ratio was 1.3 ± 0.1. Most of the students had no girlfriend nor boyfriend (76.4%) nor were they married.

Table II: Socio-demographic characteristic of the students (n=229)

Variable	n	%	Mean ± SD
Age (years)			20.17 ± 1.04
Sex			
Female	178	77.7	
Male	51	22.3	
Status of residence			
Living with family	58	25.3	
Not living with family	171	74.7	
Study program			
Accounting	53	23.1	
Aquaculture	58	25.3	
Veterinary medicine	58	25.3	
Public health	60	26.2	
Academic year			
Seventh semester (2014)	82	35.8	
Fifth semester (2015)	71	31	
Third semester (2016)	76	33.2	
BMI (Body mass index) kg/m^2			22.04±4.22
Hip to Waist ratio			1.28±0.11
GPA (Grade point average) scala=4			3.26±0.34
Relationship status			
Single	175	76.4	
Dating	52	22.7	
Married	2	0.9	
Socioeconomic status			
Very low	64	27.9	
Low	60	26.2	
Middle	55	24	
High	50	21.8	
Smoking status			
Yes	15	6.6	
No	214	93.4	
Depression			7.11±7
Normal	172	75.1	
Mild	26	11.4	
Moderate	18	7.9	
Severe	6	2.6	
Extremely	7	3.1	
Anxiety			9.14±6.56
Normal	112	48.9	
Mild	30	13.1	
Moderate	41	17.9	
Severe	30	13.1	
Extremely	16	7	
Stress			13.36±7.79
Normal	140	61.1	
Mild	32	14	
Moderate	38	16.6	
Severe	16	7	
Extremely	3	1.3	

Half of the students were of low and very low economic status and 6.6% smoked every day (Table II).

The prevalence of depression, anxiety and stress among the students were 25.0%, 51.1% and 38.9% respectively. Of these 5.7% had severe to extremely severe depression, 20.1% had severe to extremely severe anxiety and 8.3% had severe to extremely severe stress (Table II). Depression was equally distributed between gender but more female students had anxiety and stress (Table III). Students of veterinary medicine had the highest proportion of depression (29.3%) but the lowest proportion of anxiety and stress while accounting students had the highest proportion of anxiety (53.4%) and stress (48.3%) (Table III).

Table III: Prevalence of Depression, Anxiety, and Stress among Study Program (n=229)

Variables	Depression (%)	Anxiety (%)	Stress (%)
Sex			
Male	12 (23.5)	23 (45.1)	16 (31.4)
Female	45 (25.3)	94 (52.8)	73 (41.0)
Study Program Study			
Accounting	15(25.9)	31(53.4)	28(48.3)
Aquaculture	14(23.7)	31(52.5)	24(40.7)
Veterinary medicine	17(29.3)	28(48.3)	21(26.2)
Public health	14(23.3)	30(50.0)	19(31.7)

Fifth semester students had 2.18 times more odds of depression compared with the seventh semester students

(OR:2.27; 95% CI:1,02-4,68, p=0.05) in the univariable model (Table IV). After controlling for socioeconomic status, BMI, and study program, the association remained significant (AOR:2.27; 95% CI:1,04-4,93, p=0.04) (Table V). Demographic variables, study program, GPA score, nutritional status, socioeconomic status, and smoking status were not significantly associated with depression. The fifth semester students had 2.20 times the odds of having stress compared to the seventh semester students (OR=2.20;95% CI: 1.08-4.09, p=0.03) in univariable model (Table IV). The odds were slightly lower in the multivariable model. Adjusting for socioeconomic status and study program the fifth semester students had 2.18 times the odds of having stress compared to the seventh semester students (AOR=2.18;95% CI: 1.10-4.32, p=0.03) (Table V). Third semester students also had greater odds of being stressed compared to the seventh semester students but this association was borderline significant (AOR: 1.96; 95% CI: 0.99 – 3.87, p=0.05). Demographic variables, study program, GPA score, nutritional status, socioeconomic status, and smoking status were not significantly associated with stress. None of the factors analysed were significantly associated with anxiety in the final model. Gender and

Table IV: Univariable analysis of factors of depression, anxiety, and stress among students (n=229)

Variable	Depression OR[a]	95% CI Lower	95% CI Upper	P value	Anxiety OR[a]	95% CI Lower	95% CI Upper	P value	Stress OR[a]	95% CI Lower	95% CI Upper	P value
Age	0.86	0.65	1.16	0.33	1.00	0.99	1.02	0.81	0.83	0.64	1.07	0.15
Sex												
Male	Ref				Ref				Ref			
Female	1.10	0.53	2.28	0.80	1.36	0.73	2.55	0.33	1.52	0.78	2.95	0.22
Status of residence												
Living with family	Ref				Ref				Ref			
Not living with family	1.57	0.75	3.29	0.23	0.97	0.53	1.75	0.91	0.79	0.43	1.45	0.44
Study program												
Accounting	Ref				Ref				Ref			
Aquaculture	1.09	0.45	2.62	0.85	1.03	0.49	2.16	0.95	0.79	0.37	1.68	0.54
Veterinary medicine	1.42	0.60	3.34	0.43	0.83	0.40	1.76	0.63	0.64	0.30	1.36	0.24
Public health	1.04	0.43	2.50	0.93	0.89	0.43	1.87	0.76	0.52	0.24	1.12	0.09
Academic year												
Seventh semester (2014)	Ref				Ref				Ref			
Fifth semester (2015)	2.18	1.02	4.68	0.05	1.73	0.91	3.29	0.09	2.20	1.08	4.09	0.03
Third semester (2016)	1.86	0.86	3.98	0.11	1.66	0.88	3.11	0.12	1.76	0.91	3.40	0.09
BMI (Body mass index) kg/m²	1.05	0.98	1.12	0.20	1.00	0.94	1.07	0.97	1.00	0.94	1.06	0.93
Hip to Waist ratio	0.72	0.05	10.59	0.81	1.07	0.11	10.68	0.95	1.19	0.11	12.49	0.88
GPA (Grade point average)scala=4	0.80	0.33	1.94	0.62	1.01	0.94	1.10	0.75	1.18	0.53	2.60	0.69
Socioeconomic status												
Very low	Ref				Ref				Ref			
Low	1.01	0.45	2.23	0.99	1.15	0.57	2.33	0.70	0.61	0.30	1.26	0.18
Middle	0.77	0.33	1.80	0.55	0.97	0.47	2.00	0.94	0.76	0.36	1.57	0.45
High	0.87	0.37	2.05	0.76	0.80	0.38	1.68	0.56	0.53	0.25	1.15	0.11
Smoking status												
Yes	1.56	0.509	4.77	0.44	2.00	0.66	6.05	0.22	0.77	0.26	2.34	0.65
No	Ref				Ref				Ref			

[a]OR=Odds Ratio

Table V: Multivariable model of predictors of depression, anxiety and stress (N=229)

Variable	Depression				Anxiety				Stress			
	AOR[b]	95% CI		P value	AOR[b]	95% CI		P value	AOR[b]	95% CI		P value
		Lower	Upper			Lower	Upper			Lower	Upper	
Academic year												
Seventh semester (2014)	Ref				Ref				Ref			
Fifth semester (2015)	2.27	1.04	4.93	0.04	1.64	0.85	3.14	0.14	2.18	1.10	4.32	0.03
Third semester (2016)	1.92	0.88	4.20	0.10	1.58	0.83	2.98	0.16	1.96	0.99	3.87	0.05
Socioeconomic status												
Very low	Ref								Ref			
Low	0.85	0.37	1.97	0.71					0.58	0.27	1.24	0.16
Middle	0.59	0.24	1.47	0.26					0.78	0.35	1.72	0.53
High	0.68	0.27	1.74	0.43					0.57	0.25	1.31	0.18
BMI (kg/m²)	1.04	0.97	1.12	0.23								
Study program												
Accounting	Ref								Ref			
Aquaculture	1.03	0.42	2.55	0.95					0.74	0.34	1.60	0.44
Veterinary medicine	1.52	0.59	3.91	0.39					0.69	0.30	1.57	0.37
Public health	1.085	0.43	2.73	0.86					0.54	0.24	1.21	0.13
Sex												
Male					Ref							
Female					1.64	0.81	3.35	0.17				
Smoking												
No					Ref							
Yes					2.80	0.83	9.48	0.10				

[b]AOR=Adjusted Odds Ratio

smoking status, however, were found to confound the association between academic semester and anxiety (Table V).

DISCUSSION

General Findings
We found the prevalence of depression, anxiety, and stress were 25.0%, 51.1%, and 38.9% respectively among students of remote university campus. Level of education was associated with depression and stress with the fifth semester students having greater odds of having depression and stress compared to the seventh semester students after controlling for covariates.

Comparison with other studies
Our estimates were lower in depression and anxiety prevalence compared to a Malaysian study that found 30.7% of students had depression and 55.5% had anxiety and stress among their students (12); and compared to a study in Pakistan that reported 60% students had anxiety and depression (34). Our estimate, however was higher in stress prevalence compared to16.6% among Malaysian students and in depression prevalence compared to 12.9% among Swedish students (20). Similar to previous studies (12, 34, 35) we did not find any differences in depression, anxiety, and stress

between sex. However, this is in contrary to an Indian study that reported significant differences in depression, anxiety and stress among females and males (36) where more female students had depression and stress than male students (20, 23).

A study in Egypt found a significant positive relationship between academic years and depression (37). In our study, however, the association was only significant for the fifth semester students, and interestingly compared to higher semester students the lower semester students were more depressed and stressed. Our research is similar to a research conducted in Pakistan that reported depression was significantly higher in the first and second years, compared with the third and fourth years (23, 34). Different from a study in Egypt (24, 37), our study did not find any significant association between age, status of residence, study program, body mass index (BMI), hip to waist ratio, socioeconomic status, and smoking status.

Possible mechanism
The different results between countries could be explained by educational environment, difference in source of stressors and socio-demographic characteristics. The Malaysian study, for example, measured mental health among medical students, who are known to have more

challenges and stressors than students from other fields of study. In addition, differences in the lecture system, curriculum, and teaching style of lecturers may also be different between countries.

The fact that the prevalence of depression and stress were greater among lower semester students could be explained by the greater pressure to adjust to the new study environment facing the lower level students (34). In addition, students in the fifth semester had higher workload (20). Many workloads could be seen in the number of courses and practicums in semester 5. More workloads in semester 5 compared to semester 7 could be seen in the public health, aquaculture, and accounting study program with 17-380% more credits in semester 5 compared to semester 7. Most students in the fifths semester are still actively participating in extracurricular activities. In Indonesia, in some field of studies, students at the fifth semester of tertiary studies are required to begin to choose a specialization class in which they had to readjust to. This specialized class determines their final thesis and their career path. The fear of making a wrong choice could have affected their mental status.

Strength and limitations
Research on depression, anxiety, and stress in students using the DASS 42 questionnaire is still scarce in Indonesia. The results of this study can be used as a basis for conducting further research on depression, anxiety, and stress in students. Although DASS 42 can not be used to determine diagnosis, the results from DASS 42 can be used as a screening tool for referral to health service for more precise diagnosis.

The limitations of this study were the insufficient number of samples to see the comparison of mental-emotional conditions between study programs. In addition, the cross-sectional study design deter from inferring a causal mechanism. Some respondents could not finish the questionnaire because the data collection time collided with their academic schedules but these account for only 6 respondents. Data collection was conducted close to the exam period, thus our estimate may be higher than if the data collection was conducted early in the semester. Although we need to be careful in generalizing our finding, our prevalence estimates reflect the condition for students in newly established universities in Indonesia that may have infrastructure limitation as additional stressors. We expect the estimates to be lower in general population of university students in this country.

Policy implications and future studies
The high prevalence of depression, anxiety and stress among these students calls for the need to provide counseling to students early in the beginning of the establishment of a new higher education institution. Students at these level of education needs support in learning how to properly manage their mental condition. In addition, screening of mental health status should be conducted regularly in order to capture students with severe problems in order to minimize the impact of their mental problems on their academic path and future career. The screening and counseling at universities can also help the Indonesian health care system to find cases early and reduce the huge treatment gaps in mental health care. Furthermore, the academic pressure placed on students at the fifth semester should be reassessed by the university. Collaboration between higher education institution and the local health care service is needed, not only to refer severe cases for care, but also to help educate students regularly about the management of depression, anxiety, and stress. Further studies should be conducted to compare the results between well established and newly established universities and to identify intervention to improve mental health condition of students at higher education level.

CONCLUSION

The prevalence of depression, anxiety and stress among newly established remote campus students in Indonesia were 25.0%, 51.1%, and 38.9% respectively. The fifth semester students had greater odds of depression and stress compared to the seventh semester students. Psychological counseling needs to be provided early along with the establishment of new higher education institutions.

ACKNOWLEDGEMENTS

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