

An Assessment of Depression, Anxiety, and their Associated Factors amongst Doctoral Students in Bangkok, Thailand

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Abstract—Introduction: Although it is widely accepted that doctoral students face extreme pressure and exhaustion, and that their mental well-being is more likely to be at risk than compared to undergraduate or graduate students – studies on the mental health status of doctoral students is severely lacking. The aims of this study was to assess the incidence of anxiety and depression amongst doctoral students in Bangkok, Thailand and to explore the relationship between anxiety, depression, and their possible associated factors. **Materials and Methods:** A cross-sectional study was conducted amongst 160 doctoral students in Bangkok, Thailand. The Depression Anxiety Stress Scale 21 was used to assess anxiety and depression. Information was also collected on socio-demographic factors and doctoral characteristics of doctoral students. The Research Self-Efficacy Scale was utilized to measure doctoral student's perceived ability in performing research tasks and activities. The Advisory Working Alliance Inventory – Student version was utilized to assess advisor-advisee relationships. To determine if any factors were significantly associated with anxiety and depression, chi-square test of independence for categorical variables, Spearman ρ correlation for continuous variables, and hierarchical linear regression analyses were performed. **Results:** Approximately 21.9% of doctoral students showed signs of moderate anxiety and around 28.7% of doctoral students showed signs of severe-to-extremely severe anxiety. Similarly, approximately 23.8% of doctoral students showed signs of moderate depression, and around 16.3% of doctoral students showed signs of severe-to-extremely severe depression. Highest scholarly output and perceived capability in maintaining school-work-life balance were significantly associated with depression. Furthermore, age of doctoral student, research self-efficacy, and advisory working alliance had negative relationships with anxiety and depression. **Conclusion:** This study's findings reveal that anxiety and depression are prevalent amongst doctoral students in Bangkok, and calls for institutions to pay closer attention to the mental health and well-being of doctoral students. Strategies and interventions that promote research self-efficacy and advisory working alliance could be helpful in reducing and preventing anxiety and depression.

Keywords— Anxiety, advisory working alliance, depression, doctoral student, research self-efficacy, school-work-life balance.

I. INTRODUCTION

Most individuals transition from adolescence to adulthood upon entering university. These young adults now become accountable for their own lifestyle choices, have to become accustomed to a new learning environment, and have to learn to adjust to academic and social demands (Cheung et al., 2016). Young adults are exposed to innumerable of stressors at the university level which can cause them psychological

distress. Prolonged and chronic psychological distress affects the competencies of the young adults to execute or carry on with ongoing tasks (Khodarahimi et al., 2012), adversely affects the young adult's immune, cardiovascular, endocrine, and central nervous systems (Anderson et al., 1998), and can lead to severe disabilities like anxiety and major disorders like depression (Baum & Posluszny, 1999).

Anxiety and depression are the two most common mental health disorders worldwide, and can often exist as comorbidities in individuals. Anxiety has a global prevalence of 3.8% (IHME, 2017) and is an emotion characterized by fear, incessant worrying, and nervousness (Levecque et al., 2017). Depression affects approximately 300 million people worldwide (WHO, 2018) and is a mood that is characterized by feelings of hopelessness, helplessness, and worthlessness (Eisenberg, 2007).

Various studies have reported that anxiety and depression have negatively impacted young adult's behavior, their academic performances, their overall well-being (Farrer et al., 2016), and has also been associated with suicide ideation amongst young adults (Tang et al., 2018). Although a systemic review by Ibrahim et al., (2013) reported that there is a wide variation on the prevalence of anxiety and depression amongst young adults in these various studies, the rising levels of the two mental health disorders in young adults, nonetheless, has progressively become a global concern (Briggs, 2017). While in the last two decades, the incidence and prevalence of anxiety and depression is routinely assessed amongst young adults, with institutions even having expanded formal delivery of services to include counseling, disability support, academic support, mentoring, and mental health advisors to promote the mental well-being and mental health of young adults (Metcalf et al., 2018) – studies on the mental well-being or the prevalence of mental health disorders amongst doctoral students is severely lacking and has been largely overlooked.

Although it is generally accepted that doctoral students face more pressure and exhaustion than in comparison to young adults pursuing their undergraduate or graduate degrees (Stubb et al., 2011) and that their mental well-being is more likely to be at risk due to a culture of extreme workloads and high achievements – the dearth of studies on the mental health status of doctoral students is alarming and requires instant remediation. A study by Levecque et al., (2017) reported that a doctoral student is 2.4 times more likely to develop a mental health disorder than compared to young adults pursuing an

undergraduate degree. A study conducted at the Leiden University in the Netherlands, reported that 2 in 5 doctoral students are at the risk of developing a mental health disorder. A comprehensive study by Evans et al., (2018) amongst 2,279 students – of which 90% were doctoral students – across 234 institutions in 26 countries, reported that 41% of doctoral students showed symptoms of moderate-to-severe anxiety, and 39% of doctoral students showed symptoms of moderate-to-severe depression: making doctoral students six times more likely than the general population to experience anxiety and depression.

Each year has observed a global increase in doctoral student enrollment (Pyhältö et al., 2012); yet astoundingly, doctoral students have the highest attrition rates than in comparison to undergraduate and graduate students. In the US, around 50% of doctoral students do not complete their degrees (Jairam & Kahl, 2012) and around 44% of doctoral students do not complete their degrees in Europe (Hasgall et al., 2019). Doctoral students with mental health disorders are more likely to drop out of doctoral programs (Stubb et al., 2012).

A comprehensive review by Sverdlik et al., (2018) of 163 empirical studies on factors that influenced doctoral student's well-being and completion of doctoral degrees included socio-demographic factors such as age, gender, marital status, children, education, and income; disciplinary demands which are often characterized by high workloads that can lead to higher rates of burnout; doctoral student's perceived ability in maintaining a school-work-life balance; doctoral student's perceived capability in fulfilling research tasks often known as doctoral student research self-efficacy; and advisory working alliance – the relationship between the doctoral student and their advisors. These factors could possibly affect the mental health of doctoral students and therefore be associated with anxiety and depression amongst doctoral students.

It is imperative to provide a healthy and supportive research environment for the current generation of doctoral students, and even more crucial to do so for the next generation of researchers. In Thailand alone, the population of doctoral students has ballooned from 1,380 students in 2008 to 25,000 students in 2015 (Mala, 2016) – with majority enrollment of doctoral students at universities in Bangkok. This study aimed to assess the incidence of anxiety and depression in doctoral students in universities of Bangkok, Thailand and also aimed to explore the relationship between anxiety, depression, and their possible associated factors. Preliminary data from this study has major implications for health services and health policymakers at the universities of Bangkok, Thailand: encouraging them to monitor the mental health status of doctoral students, promote doctoral student mental well-being through effective prevention and intervention strategies, and counter doctoral student departure by developing strategies that promote doctoral student research self-efficacy and improve advisor-advisee relationships.

II. OBJECTIVE

The objectives of this study were two-fold. The first objective was to assess the incidence of anxiety and

depression amongst doctoral students and therefore provide an initial insight into the mental health status of doctoral students in Bangkok, Thailand. The second objective was to explore the relationship between anxiety, depression, and their possible associated factors.

III. MATERIALS AND METHODS

Participants

This cross-sectional study was conducted amongst doctoral students enrolled at Chulalongkorn and Thammasat universities in Bangkok, Thailand. The sample size was calculated based on Daniel's formula that is often utilized when calculating for sample size in cross-sectional studies, where coefficient of reliability was 1.96, proportion was based on Evans et al.'s study amongst doctoral students in 26 countries that reported 39% of postgraduates suffered from moderate-to-severe depression, and allowable margin of error was 8%. Though the required sample size was 143 doctoral students, 160 doctoral students participated in this study. A combination of convenience and purposive sampling was utilized to recruit doctoral students from either university to partake in the study.

Measures

To assess the incidence of anxiety and depression, the Depression Anxiety Stress Scale 21 (DASS 21, Lovibond & Lovibond, 1995) was utilized. DASS 21 has 7 items for each of the three respective subscales, but for the purpose of this study the scale was modified. The stress subscale was removed, leaving behind only the depression and anxiety subscales. Doctoral students rated each of the items in the two subscales on a 4-point Likert scale (0, doesn't apply to me at all; 3, applies to me very much). Total scores range from 0 to 42. On the depression subscale, scores from 0 to 9 represented normal depression, from 10 to 13 represented mild depression, from 14 to 20 represented moderate depression, from 21 to 27 represented severe depression, and a score of 28 or higher represented extremely severe depression. On the anxiety subscale, scores from 0 to 7 represented normal anxiety, from 8 to 9 represented mild anxiety, from 10 to 14 represented moderate anxiety, from 15 to 19 represented severe anxiety, and a score of 20 or higher represented extremely severe anxiety. The DASS 21 scale has been utilized in multiple studies, and predicted diagnostic presence of anxiety and depression as well as other regularly used standards (Gloster et al., 2008). It also has a high internal consistency. The Cronbach alpha scores for the depression and anxiety subscales were 0.906 and 0.835 respectively (Levecque et al., 2017).

Doctoral student's socio-demographic characteristics included age, gender, marital status, children, and individual monthly income. Additionally, some doctoral characteristics that might affect the mental health of doctoral students were also included. Doctoral students were asked if they'd been employed prior to enrollment in doctoral program (yes/no), their current year of study (1, first year; 2, second year; 3, third year; 4, fourth year or above), their highest scholarly activity involving academic presentations (1, university

presentation; 2, national presentation; 3, international presentation; 4, no presentations), their highest scholarly output involving academic publications (1, peer-reviewed journal publications; 2, peer-reviewed symposia; 3, peer-reviewed posters; 4, no publications), their frequency of meetings with their advisor (1, daily; 2, more than once a week; 3, once a week; 4, once a month; 5, less than once a month), the perceived difficulty in publishing an academic paper (1, requires a little bit of effort; 2, requires some effort; 3, requires moderate effort; 4, requires a lot of effort), the perceived difficulty in publishing a thesis (1, requires a little bit of effort; 2, requires some effort; 3, requires moderate effort; 4, requires a lot of effort), and their perceived capability in maintaining school-work-life balance (1, minimally capable; 2, somewhat capable; 3, moderately capable; 4, extremely capable)

To assess doctoral student's perceived competency in fulfilling research-related tasks and goals, the Research Self-Efficacy Scale (RSES, Greeley et al., 1989) was utilized. It comprised of 38 items with four subscales: conceptualization, implementation, early tasks, and presenting results. Doctoral students had to rate each item on a 10-point confidence scale (0, no confidence; 100, complete confidence). Total scores range from 75-3800, with a higher score indicating higher research self-efficacy. The internal consistency of RSES from previous studies was 0.96 (Beischke et al., 2000).

Doctoral student's relationship with their advisors was assessed utilizing the Advisory Working Alliance Inventory – Student version (AWAI-S, Schlosser & Gelso, 2001). It comprised of 30 items on the three domains: rapport, apprenticeship, and identification-individuation. Doctoral students had to rate each item on a 5-point Likert scale (0, strongly disagree; 5, strongly agree). 16 of the items were reverse-scored. A high score after reverse scoring indicated strong advisor-advisee relationship. The internal consistency of each domain from previous studies was 0.92, 0.90, and 0.83 respectively (Smeets, 2001).

Data Collection

All the questionnaires were brief, and utilized a self-reported measure. To amplify the ease and privacy with which doctoral students could participate in the study, doctoral students answered the questionnaires online via Google Form. All questionnaires were filled out anonymously. Written informed consent was waived for this study, although doctoral students had to acknowledge reading the Participant Information Sheet and Consent Form stated on the first section of the Google Form, before they could proceed to the sections with the questionnaires. Prior to receiving access to the study questionnaire, doctoral students were sent a screening survey via Google Form. The screening questionnaire aimed to eliminate confounding factors that could influence anxiety and depression in doctoral students, and included the following questions: whether doctoral student had ever been diagnosed with anxiety or depression by a medical professional (yes/no); when doctoral student had been diagnosed with anxiety or depression by a medical professional (1, before doctoral program; 2, after doctoral program; 3, not valid as I've never

been diagnosed), whether they'd suffered any traumatic incidence in the last six months (yes/no), whether doctoral student had been receiving counseling or psychiatric services (yes/no), when doctoral student had started to receive counseling or psychiatric services (1, before doctoral program; 2, after doctoral program; 3, not valid as I've never received those services), and whether doctoral student suffered from any physical illness (yes/no). Doctoral students who answered in the negative for all screening questions were allowed to participate in the study. This study received ethical approval from the Research Ethics Review Committee for Research Involving Human Participants, Chulalongkorn University (RECCU).

Data Analysis

Statistical Package for the Social Sciences (SPSS) version 22.0 was utilized for all statistical analyses. All independent categorical variables were represented with frequency and percentage. Continuous variables were represented with mean and standard deviation. To determine whether there were any significant associations between socio-demographic characteristics, doctoral characteristics, research self-efficacy, and advisory working alliance with anxiety and depression, the chi-square test of independence was performed. Correlations amongst age, research self-efficacy, advisory working alliance, anxiety, and depression was examined by the Spearman ρ correlation. Variables with significant association to anxiety and depression were selected for the hierarchical linear regression analyses. Anxiety and depression were modeled as dependent variables in the analysis. Categorical independent variables were dummy-coded prior to their entry in Step 1 of the analysis. In step 2 of the regression analysis, research self-efficacy was added. Lastly, in step 3, advisory working alliance was added. All statistical tests were 2-sided, a p -value of less than 0.05 ($p < 0.05$) at 95% confidence interval was considered statistically significant.

IV. RESULTS

Socio-demographic Characteristics of Doctoral Students

160 valid responses to the survey were collected. The socio-demographic characteristics of doctoral students are represented below in Table 1. The mean age of doctoral students was 34.41 ± 7.14 years, ranging from 23 to 59 years. 29.4% of the respondents were male doctoral students while 70.6% of the respondents were female doctoral students. 29.4% of doctoral students were married or cohabiting, while 69.4% of doctoral students were unmarried. 1.3% of doctoral students reported being separated or divorced. 13.1% of doctoral students had just one child, and 9.38% of doctoral students reported having more than one child. The mean individual monthly income of doctoral students was $37,275.63 \pm 33206.87$ THB, ranging from 0 to 220,000 THB per month.

Doctoral Characteristics of Doctoral Students

The doctoral characteristics of doctoral students are represented below in Table 2. Around 73.8% of doctoral students had been employed before their enrollment into

doctoral programs. 25.6% of doctoral students were in their 3rd year of study, while 35.0% doctoral students were in their 4th year of study. 41.9% of the doctoral students had engaged in international presentations as their highest level of scholarly activity, whereas 23.8% of the doctoral students still had not participated in any kind of presentations. 60% of doctoral students had been published in peer-reviewed journal publications as their highest level of scholarly output. Despite that high figure, approximately 28.8% of doctoral students had no publications of any kind. Doctoral students seldom met up with their advisors: 35.6% of doctoral students reported meeting up with their advisors only once a month, and 20.0% of doctoral students met up with their advisors less than once a month. The majority of the doctoral students perceived the level of difficulty in publishing academic papers and thesis to be quite high, 59.4% of the doctoral students reported that the completion and publication of an academic paper required a lot of effort and 66.9% of the doctoral students reported that the completion and publication of a thesis required a lot of effort too. 45.0% of the doctoral students perceived themselves to be moderately capable at maintaining school-work-life balance and 10.6% of doctoral students even perceived themselves to be extremely capable at maintaining school-work-life balance.

Incidence of Anxiety and Depression in Doctoral Students

Anxiety scores amongst doctoral students in this study ranged from 0 to 38, with a mean score of 11.45±9.240. 23.9% of doctoral students showed signs of moderate anxiety, 5.6% of doctoral students showed signs of severe anxiety, and 23.1% showed signs of extremely severe anxiety. Depression scores amongst doctoral students in this study ranged from 0 to 40, with a mean score of 11.64±9.754. 23.8% of doctoral students showed signs of moderate depression, 7.5% of doctoral students showed signs of severe depression, and 8.8% of doctoral students showed signs of extremely depression. Results are represented below in Table 3.

Socio-demographic and Doctoral Characteristics by Anxiety and Depression in Doctoral Students

Factors that were significantly different amongst doctoral students at varying levels of anxiety included gender. Factors that were significantly different amongst doctoral students at varying levels of depression included marital status, highest scholarly output, and perceived capability in maintaining school-work-life balance. Results are shown in Tables 4 and 5.

Correlations amongst Age, Anxiety, Depression, Research Self-Efficacy, and Advisory Working Alliance Scores

The correlations for anxiety and depression (DASS), RSES, and AWAI-S and age of doctoral students are represented in Table 6. A positive association was observed between anxiety and depression scores. Age, RSES, and AWAI-S scores were negatively associated with anxiety and depression scores both. A positive association was also observed between RSES and AWAI-S scores.

Associations of Advisory Working Alliance and Research Self-Efficacy with Anxiety

Age was negatively associated with anxiety ($\beta=-0.174$, $p<0.05$). After adjustment of the controlled variables, in step 2, RSES scores were found to be negatively associated with anxiety ($\beta=-0.367$, $p<0.001$) and accounted for 12.8% of the variance in anxiety scores. In step 3, AWAI-S scores were found to be negatively associated with anxiety ($\beta=-0.159$, $p<0.001$), and accounted for 2.1% of the variance in anxiety scores. The addition of AWAI-S in step 3, also diminished the absolute value of RSES β , ($\beta=-0.302$ $p<0.001$). Results are represented in Table 7.

TABLE 1. Socio-demographic Characteristics of Doctoral Students

SOCIO-DEMOGRAPHIC VARIABLES	Female doctoral students (n=113)		Male doctoral students (n=47)		Total doctoral students (n=160)	
	n	%	n	%	n	%
Gender						
Male					47	29.4
Female					113	70.6
Age (years)	<i>(M = 34.66, ±SD = 7.27)</i>		<i>(M = 33.79, ±SD = 7.00)</i>		<i>(M = 34.41, ±SD = 7.14)</i>	
21-30	37	32.7	18	38.3	55	34.4
31-40	58	51.3	21	44.7	79	49.4
≥41	18	15.9	8	17.0	26	16.3
Marital Status						
Married/Cohabiting	28	24.8	19	40.4	47	29.4
Divorced/Separated	2	1.8	-	-	2	30.6
Unmarried	83	73.5	28	59.6	111	69.4
Children						
None	94	83.2	32	68.1	126	78.8
Just one	12	10.6	9	19.1	21	13.1
More than one	7	6.2	6	12.8	13	8.1
Income (THB per month)	<i>(M = 34061.87, ±SD = 30964.57)</i>		<i>(M = 45002.13, ±SD = 37291.21)</i>		<i>(M = 37275.63, ±SD = 33206.87)</i>	
<20,000	35	31.0	15	31.9	50	31.3
20,001-50,000	68	60.2	19	40.4	87	54.4
≥50,001	10	8.8	13	27.7	23	14.4

Note. M = mean; SD = standard deviation; n = frequency, % = percentage of sample population

Associations of Advisory Working Alliance and Research Self-Efficacy with Depression

Socio-demographic and doctoral characteristics contributed to 15.5% of the variance in depression scores. Age was negatively correlated with depression scores ($\beta=-0.169$, $p<0.05$); doctoral students whose highest scholarly output was a peer-reviewed symposia scored higher on depression scale than those who had no scholarly output ($\beta=0.167$, $p<0.05$); and doctoral students who perceived themselves to be somewhat capable at maintaining a school-work-life balance scored higher on the depression scale than the doctoral students who perceived themselves to be extremely capable at maintaining a school-work-life balance ($\beta=0.337$, $p<0.05$). After adjustment of these controlled variables, in step 2, RSES was negatively associated with depression ($\beta=-0.345$, $p<0.001$) and contributed to 9.7% of the variance in depression scores. RSES also diminished the absolute value of symposia vs. no publications β . In step 3, AWAI-S was found

to be negatively associated with depression ($\beta=-0.363$, $p<0.001$), and contributed 10.5% of the variance in depression scores. On the addition of AWAI-S, the absolute value of RSES β was reduced. Results are represented in Table 8.

TABLE 2. Doctoral Characteristics of Doctoral Students

DOCTORAL VARIABLES	Female Doctoral Students (n = 113)		Male Doctoral Students (n = 47)		Total Doctoral Students (n = 160)	
	n	%	n	%	n	%
Employment before doctoral enrollment						
Employed	86	76.1	32	68.1	118	73.8
Unemployed	27	23.9	15	31.9	42	26.3
Year of Study						
First year	21	18.6	10	21.3	31	19.4
Second year	23	20.4	9	19.1	32	20.0
Third year	25	22.1	16	34.0	42	25.6
Fourth year or above	44	38.9	12	25.5	56	35.0
Highest Scholarly Activity						
International presentation	45	39.8	22	47.8	67	41.9
National presentation	14	12.4	8	17.0	22	13.8
University presentation	25	22.1	8	17.0	33	20.6
No presentation	29	25.7	9	19.1	38	23.8
Highest Scholarly Output						
Peer-reviewed journal publications	64	56.6	32	68.1	96	60.0
Peer-reviewed symposia	2	1.8	3	6.4	5	3.1
Peer-reviewed posters	10	8.8	3	6.4	13	8.1
No publications	37	32.7	9	19.1	46	28.8
Frequency of Meeting with Advisor						
Daily	5	4.4	2	4.3	7	4.4
More than once a week	18	15.9	3	6.4	21	13.1
Once a week	29	25.7	14	29.8	43	26.9
Once a month	37	32.7	20	42.6	57	35.6
Less than once a month	24	21.2	8	17.0	32	20.0
Perceived Difficulty in Publishing Academic Paper						
Requires a little bit of effort	1	0.9	1	2.1	2	1.3
Requires some effort	6	5.3	3	6.4	9	5.6
Requires moderate effort	39	34.5	15	31.9	54	33.8
Requires a lot of effort	67	59.3	28	59.6	95	59.4
Perceived Difficulty in Publishing Thesis						
Requires a little bit of effort	1	0.9	2	4.3	3	1.9
Requires some effort	8	7.1	2	4.3	10	6.3
Requires moderate effort	31	27.4	9	19.1	40	25.0
Requires a lot of effort	73	64.6	34	72.3	107	66.9
Perceived Capability in Maintaining School-Work-Life Balance						
Extremely capable	12	10.6	5	10.6	17	10.6
Moderately capable	52	46.0	20	42.6	72	45.0
Somewhat capable	43	38.1	14	29.8	57	35.6
Minimally capable	6	5.3	8	17.0	14	8.8

Note. n = frequency, % = percentage of sample population

TABLE 3. Incidence of Anxiety and Depression in Doctoral Students

	Female Doctoral Students (n = 114)		Male Doctoral Students (n = 46)		Total Doctoral Students (n = 160)	
	n	%	n	%	n	%
ANXIETY	$(M = 11.88, \pm SD = 9.248)$		$(M = 10.43, \pm SD = 9.240)$		$(M = 11.45, \pm SD = 9.240)$	
Normal	38	33.6	22	46.8	60	37.5
Mild	15	13.3	4	8.5	19	11.9
Moderate	28	24.8	7	14.9	35	21.9
Severe	3	2.7	6	12.8	9	5.6
Extremely Severe	29	25.7	8	17.0	37	23.1
DEPRESSION	$(M = 11.63, \pm SD = 8.838)$		$(M = 11.66, \pm SD = 11.776)$		$(M = 11.64, \pm SD = 9.754)$	
Normal	47	41.6	26	55.3	73	45.6
Mild	19	16.8	4	8.5	23	14.4
Moderate	31	27.4	7	14.9	38	23.8
Severe	8	7.1	4	8.5	12	7.5
Extremely Severe	8	7.1	6	12.8	14	8.8

Note. M = mean; SD = standard deviation; n = frequency; % = percentage of sample population

TABLE 4. Socio-demographic and Doctoral Characteristics of Doctoral Students by Anxiety

SOCIO-DEMOGRAPHIC AND DOCOTRAL VARIABLES	ANXIETY										Chi-square value	p-value
	Normal		Mild		Moderate		Severe		Extremely Severe			
	n	%	n	%	n	%	n	%	n	%		
Age (years)												
21-30	17	28.3	6	31.6	10	28.6	5	55.6	17	45.9		
31-40	34	56.7	8	42.1	18	51.4	2	22.2	17	45.9		
≥41	9	15.0	5	26.3	7	20.0	2	22.2	3	8.1		
Gender											10.760	0.029*
Male	22	36.7	4	21.1	7	20.0	6	66.7	8	21.6		
Female	38	63.3	15	78.9	28	80.0	3	33.3	29	78.4		
Marital Status											6.188	0.626
Married/Cohabiting	18	30.0	8	42.1	10	28.6	2	22.2	9	24.3		
Divorced/Separated	1	1.7	1	5.3	-	-	-	-	-	-		
Unmarried	41	68.3	10	52.6	25	71.4	7	77.8	28	75.7		
Children											3.777	0.877
None	46	76.7	15	78.9	26	74.3	7	77.8	32	86.5		
Just one	7	11.7	3	15.8	6	17.1	1	11.1	4	10.8		
More than one	7	11.7	1	5.3	3	8.6	1	11.1	1	2.7		
Income (THB per month)											12.513	0.128
≤20,000	18	30.0	5	26.3	9	25.7	6	66.7	12	32.4		
20,001-50,000	34	56.7	9	47.4	20	57.1	1	11.1	23	62.2		
≥50,001	8	13.3	5	26.3	6	17.1	2	22.2	2	5.4		
Employment status prior doctoral enrollment											4.332	0.363
Employed	46	76.7	14	73.7	26	74.3	4	44.4	28	75.7		
Unemployed	14	23.3	5	26.3	9	25.7	5	55.6	9	24.3		
Year of Study											17.133	0.145
First year	15	25.0	2	10.5	3	8.6	3	33.3	8	21.6		
Second year	10	16.7	3	15.8	8	22.9	3	33.3	8	21.6		
Third year	8	13.3	8	42.1	12	34.3	2	22.2	11	29.7		
Fourth year or above	27	45.0	6	31.6	12	34.3	1	11.1	10	27.0		
Highest Scholarly Activity											10.180	0.600
International presentation	31	51.7	8	42.1	9	25.7	4	44.4	15	40.5		
National presentation	6	10.0	3	15.8	8	22.9	-	-	5	13.5		
University presentation	12	20.0	3	15.8	7	20.0	2	22.2	9	24.3		
No presentation	11	18.3	5	26.3	11	31.4	3	33.3	8	21.6		
Highest Scholarly Output											10.707	0.554
Peer-reviewed journal publications	38	63.3	11	57.9	24	68.6	6	66.7	17	45.9		
Peer-reviewed symposia	2	3.3	-	-	-	-	-	-	3	8.1		
Peer-reviewed posters	4	6.7	3	15.8	3	8.6	-	-	3	8.1		
No publications	16	26.7	5	26.3	8	22.9	3	33.3	14	37.8		
Frequency of Meeting with Advisor											19.318	0.253
Daily	3	5.0	-	-	-	-	2	22.2	2	5.4		
More than once a week	5	8.3	3	15.8	6	17.1	1	11.1	6	16.2		
Once a week	17	28.3	6	31.6	7	20.0	3	33.3	10	27.0		
Once a month	26	43.3	5	26.3	11	31.4	1	11.1	14	37.8		
Less than once a month	9	15.0	5	26.3	11	31.4	2	22.2	5	13.5		
Perceived Difficulty in Publishing Academic Paper											18.746	0.095
Requires a little bit of effort	-	-	-	-	2	5.7	-	-	-	-		
Requires some effort	4	6.7	1	5.3	-	-	-	-	4	10.8		
Requires moderate effort	23	38.3	8	42.1	12	34.3	5	55.6	6	16.2		
Requires a lot of effort	33	55.0	10	52.6	21	60.0	4	44.4	27	73.0		
Perceived Difficulty in Publishing Thesis											9.924	0.623
Requires a little bit of effort	-	-	-	-	2	5.7	-	-	1	2.7		
Requires some effort	5	8.3	2	10.5	2	5.7	-	-	1	2.7		
Requires moderate effort	18	30.0	5	26.3	8	22.9	3	33.3	6	16.2		
Requires a lot of effort	37	61.7	12	63.2	23	65.7	6	66.7	29	78.4		
Perceived Capability in Maintaining School-Work-Life Balance											12.348	0.411
Extremely capable	4	6.7	2	10.5	5	14.3	1	11.1	2	5.4		
Moderately capable	15	25.0	6	31.6	13	37.1	4	44.4	19	51.4		
Somewhat capable	31	51.7	10	52.6	15	42.9	3	33.3	13	35.1		
Minimally capable	10	16.7	1	5.3	2	5.7	1	11.1	3	8.1		

Note. n = frequency; % = percentage of sample population; * = statistically significant at p-value <0.05

TABLE 5. Socio-demographic and Doctoral Characteristics of Doctoral Students by Depression

SOCIO-DEMOGRAPHIC AND DOCOTRAL VARIABLES	DEPRESSION										Chi-square value	p-value
	Normal		Mild		Moderate		Severe		Extremely Severe			
	n	%	n	%	n	%	n	%	n	%		
Age (years)												
21-30	22	30.1	6	26.1	15	39.5	5	41.7	7	50.0		
31-40	37	50.7	13	56.5	16	42.1	6	50.0	7	50.0		
≥41	14	19.2	4	17.4	7	18.4	1	8.3	-	-		
Gender											6.478	0.166
Male	26	35.6	4	17.4	7	18.4	4	33.3	6	42.9		
Female	47	64.4	19	82.6	31	81.6	8	66.7	8	57.1		
Marital Status											16.900	0.031*
Married/Cohabiting	27	37.0	3	13.0	9	23.7	4	33.3	4	28.6		
Divorced/Separated	-	-	2	8.7	-	-	-	-	-	-		
Unmarried	46	63.0	18	78.3	29	76.3	8	66.7	10	71.4		
Children											4.350	0.824
None	55	75.3	18	78.3	32	84.2	9	75.0	12	85.7		
Just one	10	13.7	3	13.0	4	10.5	3	25.0	1	7.1		
More than one	8	11.0	2	8.7	2	5.3	-	-	1	7.1		
Income (THB per month)											3.321	0.913
≤20,000	21	28.8	7	30.4	15	39.5	3	25.0	4	28.6		
20,001-50,000	40	54.8	12	52.2	18	47.4	8	66.7	9	64.3		
≥50,001	12	16.4	4	17.4	5	13.2	1	8.3	1	7.1		
Employment status prior doctoral enrollment											2.718	0.606
Employed	54	74.0	19	82.6	27	71.1	7	58.3	11	78.6		
Unemployed	19	26.0	4	17.4	11	28.9	5	41.7	3	21.4		
Year of Study											12.445	0.411
First year	15	20.5	5	21.7	6	15.8	2	16.7	3	21.4		
Second year	15	20.5	1	4.3	11	28.9	3	25.0	2	14.3		
Third year	17	23.3	5	21.7	8	21.1	5	41.7	6	42.9		
Fourth year or above	26	35.6	12	52.2	13	34.2	2	16.7	3	21.4		
Highest Scholarly Activity											20.482	0.059
International presentation	34	46.6	11	47.8	11	28.9	4	33.3	7	50.0		
National presentation	7	9.6	5	21.7	5	13.2	4	33.3	1	7.1		
University presentation	14	19.2	6	26.1	6	15.8	3	25.0	4	28.6		
No presentation	18	24.7	1	4.3	16	42.1	1	8.3	2	14.3		
Highest Scholarly Output											23.931	0.021*
Peer-reviewed journal publications	47	64.4	13	56.5	21	55.3	8	66.7	7	50.0		
Peer-reviewed symposia	2	2.7	-	-	-	-	-	-	3	21.4		
Peer-reviewed posters	6	8.2	3	13.0	2	5.3	2	16.7	-	-		
No publications	18	24.7	7	30.4	15	39.5	2	16.7	4	28.6		
Frequency of Meeting with Advisor											15.464	0.491
Daily	3	4.1	1	4.3	3	7.9	-	-	-	-		
More than once a week	10	13.7	4	17.4	3	7.9	-	-	1	7.1		
Once a week	24	32.9	4	17.4	7	18.4	3	25.0	6	42.9		
Once a month	26	35.6	6	26.1	15	39.5	2	16.7	5	35.7		
Less than once a month	10	13.7	8	34.8	10	26.3	5	41.7	2	14.3		
Perceived Difficulty in Publishing Academic Paper											13.182	0.356
Requires a little bit of effort	-	-	1	4.3	1	2.6	-	-	-	-		
Requires some effort	5	6.8	-	-	1	2.6	1	8.3	2	14.3		
Requires moderate effort	31	42.5	7	30.4	9	23.7	4	33.3	3	21.4		
Requires a lot of effort	37	50.7	15	65.2	27	71.1	7	58.3	9	64.3		
Perceived Difficulty in Publishing Thesis											18.836	0.093
Requires a little bit of effort	-	-	1	4.3	1	2.6	-	-	1	7.1		
Requires some effort	6	8.2	3	13.0	1	2.6	-	-	-	-		
Requires moderate effort	26	35.6	3	13.0	8	21.1	2	16.7	1	7.1		
Requires a lot of effort	41	56.2	16	69.6	28	73.7	10	83.3	12	85.7		
Perceived Capability in Maintaining School-Work-Life Balance											25.726	0.012*
Extremely capable	11	15.1	2	8.7	2	5.3	1	8.3	1	7.1		
Moderately capable	43	58.9	9	39.1	12	31.6	2	16.7	6	42.9		
Somewhat capable	14	19.2	10	43.5	19	50.0	9	75.0	5	35.7		
Minimally capable	5	6.8	2	8.7	5	13.2	-	-	2	14.3		

Note. n = frequency; % = percentage of sample population; * = statistically significant at p-value <0.05

TABLE 6. Correlations amongst age, RSES, AWAI-S, Anxiety (DASS) and Depression (DASS) scores

Continuous variables	Age (years)	RSES	AWAI-S	Anxiety (DASS)	Depression (DASS)
Age (years)	1				
RSES	0.126	1			
AWAI-S	0.024	0.409**	1		
Anxiety (DASS)	-0.117	-0.372**	-0.326**	1	
Depression (DASS)	-0.197*	-0.475**	-0.495**	0.795**	1

Note. * $p < 0.05$ (2-tailed); ** $p < 0.01$ (2-tailed)
 Abbreviations: RSES, Research Self-Efficacy Scale; AWAI-S, Advisory Working Alliance Inventory – Student Version; DASS, Depression Anxiety Stress Scale

TABLE 7. Factors Associated to Anxiety

	Anxiety (DASS) Scores		
	Step 1 (β)	Step 2 (β)	Step 2 (β)
Step 1			
Age (in years)	-0.174*	-0.108	-0.102
Gender	-0.076	-0.030	-0.032
Step 2			
RSES		-0.367***	-0.302***
Step 3			
AWAI-S			-0.159*
F	2.793	9.944***	8.584***
Adjusted R ²	0.022	0.147	0.163
ΔR^2	0.035	0.128***	0.021*

Note. * $p < 0.05$ (2-tailed); ** $p < 0.01$ (2-tailed); *** $p < 0.001$ (2-tailed)
 Abbreviations: RSES, Research Self-Efficacy Scale; AWAI-S, Advisory Working Alliance Inventory – Student Version; DASS, Depression Anxiety Stress Scale

TABLE 8. Factors Associated to Depression

	Depression (DASS) Scores		
	Step 1 (β)	Step 2 (β)	Step 2 (β)
Step 1			
Age (in years)	-0.169*	-0.136	-0.116
Marital Status			
Married vs. single	-0.077	-0.074	-0.069
Divorced vs. single	0.010	0.028	0.027
Highest scholarly output			
Journal vs. none	-0.016	0.003	-0.022
Symposia vs. none	0.167*	0.152*	0.123
Posters vs. none	-0.040	-0.029	-0.048
School-Work-Life Balance			
Minimally capable vs. extremely capable	0.199	0.085	0.052
Somewhat capable vs. extremely capable	0.337*	0.131	0.164
Moderately capable vs. extremely capable	0.093	-0.030	0.005
Physical Activity	-0.036	-0.041	-0.015
Step 2			
RSES		-0.345***	-0.196*
Step 3			
AWAI-S			-0.363***
F	2.676**	4.445***	6.669***
Adjusted R ²	0.097	0.195	0.304
ΔR^2	0.155**	0.097***	0.105***

Note. * $p < 0.05$ (2-tailed); ** $p < 0.01$ (2-tailed); *** $p < 0.001$ (2-tailed)
 Abbreviations: RSES, Research Self-Efficacy Scale; AWAI-S, Advisory Working Alliance Inventory – Student Version; DASS, Depression Anxiety Stress Scale

V. DISCUSSION

With the population of ‘student’ researchers increasing every year, it has become imperative to monitor the well-being of doctoral students and therefore gain an insight on the

mental health status of doctoral students. This study firstly aimed to assess the incidence of anxiety and depression in doctoral students in Bangkok, Thailand. Though the sample population size of this study was small, and by no means could it represent the incidence of anxiety and depression amongst all doctoral students of Bangkok – this study did find that the incidence of anxiety and depression is alarmingly high amongst doctoral students. Approximately 21.9% of doctoral students showed symptoms of moderate anxiety and around 28.7% of doctoral students showed symptoms of severe-to-extremely severe anxiety. Similarly, approximately 23.8% of doctoral students showed symptoms of moderate depression, whereas around 16.3% of doctoral students showed symptoms of severe-to-extremely severe depression. In spite of the paucity of studies on the mental health of doctoral students, the findings of this study are congruent with studies that had similar observations. A study by Bernstein (2015) amongst doctoral students at the University of California, found that 42% of students at the Faculty of Science and 48% of students at the Faculty of Engineering to be depressed; Levecque et al., (2017) reported that 33.3% of doctoral students experienced common psychiatric disorders like depression, and a recent study by Liu et al., (2019) amongst doctoral students at a Chinese medical university, reported 20% of the study population showing symptoms of moderate-to-severe anxiety, and 23.7% of the study population showing symptoms of moderate-to-severe depression. The findings of this study in combination with the other studies reveals that anxiety and depression are astoundingly prevalent amongst doctoral students and that there is a dire need to understand mental health issues amongst doctoral students.

The second aim of this study was to explore the relationships between anxiety, depression, and their possible associated factors. This study found a significant association between gender and anxiety, but could not report the same for gender and depression. Evans et al.’s (2018) comprehensive survey amongst doctoral students in 26 countries reported a significant association between gender of doctoral students with anxiety and depression. Female doctoral students were consistently more likely to suffer from mental health disorders than male doctoral students. This study also found a significant association between marital status and depression, but the same association was not found between marital status and anxiety. A significant association was found between highest scholarly output and depression, with doctoral students who had participated in peer-reviewed symposia scoring higher on the depression scale than doctoral students who had no publications whatsoever. This study also found a significant association between perceived capability in maintaining school-work-life balance and depression, with doctoral students who perceived themselves to be somewhat capable at maintaining school-work-life balance scoring higher on the depression scale than doctoral students who perceived themselves to be extremely capable. Similarly, a study by Uqdah et al., (2009) also reported that an inability to maintain school-work-life correlated with higher levels of depression. Difficulty balancing school-work-life places immense pressure on doctoral students and impedes their

progress in doctoral programs, leading to poorer mental health (Liu et al., 2019).

A statistically significant and negative association was found between research self-efficacy with anxiety and depression. Doctoral students who perceived themselves to be extremely capable at fulfilling research tasks scored lower on the anxiety and depression (DASS) scale than doctoral students who didn't find themselves that capable. This finding is consistent with the Liu et al.'s study which also reported a negative association between research self-efficacy with anxiety and depression. A study conducted by Litalien and Guay (2015) found that perceived research self-efficacy to be the highest predictor of doctoral attrition.

This study also found a statistically significant and negative association between advisory working alliance with anxiety and depression. Studies have reported that ineffective advisor mentoring style affected the mental health of doctoral students and also contributed to doctoral student attrition rates (Lee, 2008). Doctoral students who reported strong advisor-advisee relationship scored lower on the anxiety and depression (DASS) scale than compared to doctoral students who perceived the relationship with their advisors to be weaker.

A statistically significant and positive association was found between anxiety and depression scores, corresponding with various studies that report anxiety and depression existing as comorbidities amongst individuals. In addition, a statistically significant and positive association was found between research self-efficacy and advisory working alliance. A study by Lovitts (2001) claimed that the relationship a doctoral student has with their advisor is the primary and oftentimes the most influential external factor that affected a doctoral student's experiences.

Lastly, the findings from this study also indicated that advisory working alliance could partially mediate the relationship between research self-efficacy with anxiety and depression. A study by Lunsford (2012) reported that mentorship styles that advisors adopt affected doctoral student's research self-efficacy, productivity, confidence, and the doctoral student's growth as a scientist. This result is congruent with Liu et al.'s study, which had further studied the mediating effect of advisory working alliance on the association between research self-efficacy with anxiety and depression.

VI. LIMITATIONS

As this study utilized an exploratory survey to assess the incidence of anxiety and depression amongst a small sample of doctoral students in Bangkok, the results of this study are not representative of all the doctoral students in Bangkok, Thailand. Additionally, as this was a cross-sectional study, causality between variables of interest was not revealed, and for the purpose of this study, non-causality between variables of interest was presumed. Lastly, the study utilized a self-report survey, therefore the responses in the survey might represent a degree of self-bias from the doctoral students and might not entirely be truthful.

VII. CONCLUSION

Insight on the mental health status of doctoral students is as deserving as populations whose mental health is routinely assessed. The preliminary data collected from this study is a cause of concern and therefore entails a series of recommendations to doctoral programs, health services and policymakers at universities of Bangkok, Thailand: to screen for anxiety and depression amongst doctoral students once a year or detect at-risk doctoral students and encourage them to pursue appropriate counseling services available at the university; to monitor advisor-advisee relationships whilst adopting flexible methods to amend the relationships; to develop courses that improve doctoral student research self-efficacy such as those that are concerned with choosing research topics, analyzing data, and writing academic papers; and to organize regular meetings with doctoral student and their thesis committee in order to provide doctoral students with external support and considerably needed reality-checks on their doctoral degree progression.

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