

# Factors Associated with Depression in Preclinical Medical Students: A Cross-Sectional Study in a Thai Medical School

**Tattiya Wisanuyothin**

Siriraj Hospital

**Chinnawudh Sawee**

Siriraj Hospital

**Nattha Saisavoey**

Siriraj Hospital

**Lakkana Thongchot**

Siriraj Hospital

**Yodying Dangprapai** (✉ [yodying.dan@mahidol.ac.th](mailto:yodying.dan@mahidol.ac.th))

Siriraj Hospital

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## Research Article

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# Abstract

**Background:** Depression is one of the most common mental illnesses that decrease quality of life. Medical students worldwide are increasingly affected by depression. This article focuses on depression in the preclinical medical students whose learning environment is different from medical students in clinical years. The aim of this study is to determine: (1) the prevalence of depression in Thai preclinical medical students; and (2) the factors associated with depression. This study will contribute to more specific and proper interventions concerning depression in Thai preclinical medical students.

**Methods:** A cross-sectional study was performed at the Faculty of Medicine Siriraj Hospital, Mahidol University, Thailand. The Patient Health Questionnaire-9 (PHQ-9), Thai version was applied to explore prevalence of depression. The selected associated factors, including interpersonal relationships, mindfulness, and self-esteem were determined using peer-relationship questionnaire, family-relationship questionnaire, Thai version of the Philadelphia Mindfulness Scale (PHLMS) and Thai version of Rosenberg's self-esteem scale respectively. Analysis was done using risk estimation by applying a contingency table and univariate logistic regression.

**Results:** Among 275 preclinical medical students participating in this study, 71 (25.8%, 95%CI[ 0.207,0.310]) had a PHQ-9 score of 9 or more. Four associated factors were significantly correlated with lower PHQ-9 scores. These protective factors included (1) a personal counselor or peer support; (2) a good family relationship; (3) a higher score in the Thai version of the Philadelphia Mindfulness Scale (PHLMS); and (4) autonomy in the medical student's decision to study medicine.

**Conclusion:** The prevalence of depression among Thai preclinical medical students was found to be higher than that of the general population (18.4%). Several factors were associated with a lower PHQ-9 score, including having a personal counselor or peer support, the participant's own decision to study at medical school, having a good family relationship, and having mindful thoughts.

## Background

Depression is one of the most common mental illnesses that can affect an individual's quality of life. WHO estimates in 2015 suggested that 322 million people have depression, accounting for 4.4% of the global population, representing an increase of 18.4% compared to in 2005.<sup>1</sup> In Thailand, according to the Thai Mental Health Epidemiology Report in 2008, 1.5 million people or 3% of the Thai population have depression. The prevalence of depression tends to be low in childhood and becomes higher during the adolescent period until early middle-aged,<sup>2</sup> with one study reporting the prevalence of depression increases from 1.5–2.5% in childhood to 15–20% in late adolescence.<sup>3</sup>

There has been several studies performed regarding the prevalence of depression among medical students. Dahlin's study stated that the prevalence of depression among medical students in Sweden was 12.9% and the associated factors included stress from studying and a high workload.<sup>4</sup> Sidana found a

prevalence of stress of 21.5% among medical students in India.<sup>5</sup> For Thai medical students, the prevalence of depression has been reported to be 19.6%, with the associated factors including relationship problems, family problems, and sleep deprivation.<sup>6</sup> Not surprisingly, students experience a significant decline in learning efficacy during depressive episodes.<sup>7</sup>

Depression is associated with multiple factors. Internal factors, such as factors associated with the family or friends, play key roles in some people developing depression during adolescence. Some internal factors that can help predict the chances of adolescents developing depression are self-esteem issues and worries about grade point average (GPAX) scores.<sup>8</sup> Another predictor, which is associated with the family, is childhood-nurturing issues. Relationships with friends were also found to be correlated with depression in adolescents when analyzed with various other factors, including gender, GPAX, self-esteem, and family relationship.<sup>9</sup>

Depression affects not only those with the condition, but also their family members, friends, and colleagues. In a medical school, it is crucial to detect and to provide proper care for students suffering from depression. More information about the factors associated with depression will benefit both screening protocols and inform how to provide care for the affected students. Nevertheless, there is a lack of studies regarding the characteristics of depression in Thai medical students, especially regarding the associated factors. Consequently, this study aimed to explore the prevalence of depression in Thai preclinical medical students and the association between depression and several factors, including internal factors, factors associated with family and friends, and the students' mindfulness level.

## Methods

### Study design

This study was approved by the Institutional Review Board of the Faculty of Medicine Siriraj Hospital, Mahidol University. It involved a cross-sectional study conducted in September 2019 among the 2nd year medical students of Siriraj Medical School. Every student was invited to participate in the study. Informed consents were obtained after the aims and objectives of the study had been explained by the researchers, who were not teachers. Each participant voluntarily decided to join the study.

### Sample size calculation

The sample size was calculated using the following formula:

$$n = \frac{z^2 \times p(1 - p)}{\epsilon^2}$$

where,  $n$  = number of participants;  $z$  = Z-score, corresponding to a significance criterion of 0.05, which is 1.960;  $p$  = pre-study estimation of the prevalence of depression among medical students, which was 19.6% as reported in a previous study<sup>8</sup>; and  $\epsilon$  = the amount of error that can be tolerated, which is 0.05.

From the calculation, it was found that 243 preclinical medical students were required in this study.

## Data collection

A research questionnaire was given to the participants via an online data collection platform. This questionnaire consisted of six parts. The first part aimed to collect general information, including sex, GPAX, parents' marriage status, main caregiver, monthly family income, having a personal counselor, physical illness, family history of psychiatric disorders, and autonomy for the participant's decision to study medicine.

The second part was the Thai version of the 9-item Patient Health Questionnaire (PHQ-9). The PHQ-9 questionnaire is a self-assessment tool derived from the Primary Care Evaluation of Mental Disorders (PRIME-MD). PRIME-MD was developed in the United States as a screening instrument for primary care clinics, but its lengthy administration time has limited its clinical usefulness.<sup>10</sup> The Patient Health Questionnaire was developed as a more user-friendly questionnaire. The PHQ-9 consists of 9 symptoms according to the diagnostic criteria for Major Depressive Disorder in Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV).<sup>11</sup> Scores for each item in the PHQ-9 range from 0 (not at all), to 1 (several days), 2 (more than half the days), and 3 (nearly every day). With just the 9 items in PHQ-9, a provisional diagnosis of depressive disorder can be decided, and its severity can be graded. The Thai version of PHQ-9 was developed in 2008 with a sensitivity at a cut-off value of 9 or greater of 0.84 and a specificity of 0.77.<sup>12</sup>

The third part of the questionnaire was the Thai version of Rosenberg's self-esteem scale, which consists of 10 items.<sup>13,14</sup> Scores from each item range from 1–4. Higher scores correlate with higher self-esteem.

The fourth part of the questionnaire was a peer-relationship questionnaire,<sup>15</sup> which included 23 items, using a Likert rating scale ranging from 1 to 5. Higher scores are correlated with a positive attitude toward friendship. The fifth part was a family-relationship questionnaire<sup>15</sup>, consisting of 23 items using the same scale as used in the peer-relationship questionnaire. Higher scores are associated with a better family relationship.

Finally, the last part of the questionnaire was the Thai version of the Philadelphia Mindfulness Scale (PHLMS).<sup>16</sup> This is a tool designed for assessing mindfulness, and it consists of two subscales, namely an awareness scale and acceptance scale, which can be measured independently with minimal inter-factor correlation<sup>17</sup> using a Likert rating scale from 1 to 5.

## Statistical methods

The analysis was started by calculating the percentage prevalence of depression. Data were analyzed using SPSS software version 26. Chi-square or univariate logistic regressions were used to identify associations between variables from the questionnaires and depressive symptoms. A p-value < 0.05 was set as the threshold of statistical significance.

## Results

Of the 275 medical students who participated in this study, 136 were males (49.4%). Most of the participants (82.2%) had a GPAX score above 3.25 of 4.00. A minority (9.1%) had divorced parents. Only 2.2% had a main caregiver who was neither their father nor mother. Just over a quarter, or 27.3%, had a monthly family income of less than 50,000 baht. Most of the participants had a personal counselor (81.8%). A few, 12%, had an underlying disease, while a smaller number, 2.9%, had a family history of psychiatric disorders. For 9.4% of the participants, it was not their own decision to study medicine.

Using a cut-off value of 9 or greater for the PHQ-9 score, 71 participants (25.8%, 95%CI[0.207,0.301]) scored 9 or more, which indicated depression (Table 1). Two factors in the general information part were found to be significantly correlated with the PHQ-9 score. (Table 2): first, having a personal counselor or peer support, which was found to be associated with a lower prevalence of depression (OR = 0.40, 95%CI [0.21,0.75];  $p = 0.04$ ), and second, autonomy in their decision to study medicine. Students who made their own decision to study medicine were found to have a lower prevalence of depression (OR = 0.36, 95%CI[0.16,0.83];  $p = 0.013$ ).

Table 1  
PHQ-9 scores

PHQ-9 scores	Number of students (%)
$\geq 9$	71 (25.8%)
$< 9$	204 (74.2%)

Table 2  
Factors associated with depression

General information		Depressed	Not depressed	ORs (CI)	p-value
Sex	male	30	106	0.67 (0.39–1.17)	0.159
	female	41	98		
GPAX	≥ 3.25	60	166	1.25 (0.60–2.59)	0.552
	< 3.25	11	38		
Parent's marriage status	married	62	188	0.59 (0.25–1.39)	0.222
	divorced	9	16		
Main caregiver	mother/father	70	199	1.76 (0.20–15.31)	0.605
	others	1	5		
Family income	≥ 50,000	54	146	1.26 (0.68–2.36)	0.465
	< 50,000	17	58		
Personal counselor	present	50	175	0.40 (0.21–0.75)	0.004
	absent	21	29		
Underlying disease	present	13	20	2.06 (0.97–4.40)	0.057
	absent	58	184		
Family history of psychiatric disorders	present	0	8	0.73 (0.68–0.79)	0.090
	absent	71	196		
Autonomy on decision to study medicine	self-decided	59	190	0.36 (0.16–0.83)	0.013
	not self-decided	12	14		

Among the standardized questionnaire parts, a good family relationship and a higher score in the Thai version of the Philadelphia Mindfulness Scale (PHLMS) were found to be significantly negatively correlated with the prevalence of depression with  $\beta = -0.066$ ,  $p = 0.00$  and  $\beta = -0.120$ ,  $p = 0.00$ , respectively (Table 3). For PHLMS, when analyzing the acceptance part and awareness part independently, it was

found that a higher score in the acceptance part was significantly correlated with a lower prevalence of depression.

Table 3  
Correlation of depression among the standardized questionnaires

Questionnaire	$\beta$	S.E.	<i>p</i> -value	Exp( $\beta$ )
Thai version of Rosenberg's self-esteem scale	0.192	0.067	0.004	1.211
Peer-relationship questionnaire	0.038	0.028	0.173	1.039
Family-relationship questionnaire	-0.050	0.016	0.02	0.951
Philadelphia mindfulness scale - <i>Acceptance</i>	-0.170	0.025	< 0.01	0.844
Philadelphia mindfulness scale - <i>Awareness</i>	-0.022	0.024	0.368	0.978
Philadelphia mindfulness scale- <i>Combined</i>	-0.120	0.020	< 0.01	0.887

## Discussion

This study demonstrated that the prevalence of depression among preclinical medical students at the Faculty of Medicine Siriraj Hospital was 25.8%, which was 8.6 times higher than the prevalence of depression in normal Thai population (3%). This result corresponded to the findings from a study performed at Midwestern University, United States, where the prevalence of depression in medical students was 23.7%,<sup>18</sup> and also corresponded with a study at the Medical College, New Delhi, India, where 21.5% of medical students were reported to have depression.<sup>5</sup> Compared with the study of the prevalence of depression in medical students in the Faculty of Medicine Siriraj Hospital published in 2007, which showed a prevalence of 19.6%, the current prevalence of depression was significantly higher by 31.6%.<sup>6</sup>

The present study also highlights the factors associated with depression among Thai medical students. Having a personal counselor or peer support was found to be correlated with a lower PHQ-9 score. This finding corresponds to a study in Germany on in-patients at a psychiatric department with depression, which revealed a significant improvement in the self-rated mood of the participants after they received counseling.<sup>19</sup> Another factor that was found to be associated with a lower PHQ-9 score in our study was the autonomy in the medical student's decision to study medicine. To the best of our knowledge, there has been no previous study on the association between this factor and depression in medical students.

In terms of family factors, having trust in parents helps fulfill the basic needs of children, including a sense of safety and connectedness to others; while if children's needs cannot be fulfilled, they might develop inappropriate coping strategies, such as rumination.<sup>20</sup> Many studies<sup>21,22,23</sup> have revealed that parental support is a protective factor against adolescent's developing depression. Despite only showing a small magnitude in this study, getting a higher score in the questionnaire for the family relationship

significantly indicated that the student would be at lower risk of developing depression. This result corresponded with data from a study performed with Thai high-school students, which revealed that parent–child relationship problems were significantly associated with depression.<sup>21</sup> A study on United States adolescents also showed that poor parental support, meaning a lack of caring, sympathizing, and accommodating, significantly predicted depressive symptoms in adolescents.<sup>22</sup> Parent–child connectedness also predicted a decrease in the depressive symptoms of both male and female United States adolescents.<sup>23</sup>

Mindfulness has received a great deal of interest in the past decades. Several studies have revealed that mindfulness interventions, such as mindfulness-based stress reduction (MBSR) and mindfulness-based cognitive therapy (MBCT), have positive outcomes with chronic pain and psychopathology, e.g., depression.<sup>24</sup> The Philadelphia Mindfulness Scale (PHLMS) was developed as a two-factor trait measure of mindfulness, acceptance, and awareness, which can be measured independently with minimal inter-factor correlation.<sup>17</sup> Cardaciotto differentiated mindfulness into acceptance and awareness components.<sup>17</sup> Awareness is characterized as a continuous monitoring of experience with a focus on current experience rather than a preoccupation with past or future events.<sup>25,26</sup> Acceptance has been defined as experiencing events fully and without defense, as they are.<sup>27</sup> In our study, higher Thai-version PHLMS acceptance scores were associated with lower PHQ-9 scores. This result corresponded with a study on undergraduate students in Pennsylvania, in which higher PHLMS acceptance scores were found to be correlated with lower scores on measures of psychopathology.<sup>17</sup> In this study, awareness did not show a significant correlation with depression, which is similar to several other studies. In particular, awareness and its analogues did not appear to have a significant relationship with pathology.<sup>17,28</sup> On the other hand, in some populations, e.g., meditators, awareness often appears to be associated with reduced pathology.<sup>28</sup> These inconsistent findings suggest that there might be a role played by mediating variables, including meditation experience<sup>28</sup>, and demographics.<sup>29</sup>

## Study Limitations And Suggestions

Our study used the Thai version of the 9-item Patient Health (PHQ-9) questionnaire as a screening tool for depression, which has a sensitivity of 0.84 and specificity 0.77 in diagnosing major depressive disorder when using a cut-off value of 9 or greater. Further evaluation, such as using the Mini International Neuropsychiatric Interview (M.I.N.I.) or a given diagnosis by a psychiatrist, may be applied for more accuracy for diagnosing depression. It is important to note that the present study was done only in preclinical-year medical students. The results may be different when the focus is on clinical-year medical students or when evaluating both preclinical-year and clinical-year students at the same time due to differences in their routine daily life and learning platforms.

## Conclusion

Depression is one of the major burdens of medical students. Peer support is one of the protective factors to avoid getting depression and this is not limited to just their friends supporting them. Teachers are one of the key counselors that students may look to, so teachers having good counseling skills can be crucial for helping students with depression. Modifying the academic curriculum to promote peer support may help to lower the problem, but further study should be conducted in this area. Providing adequate information about studying medicine to the parents of high-school students and correcting the attitude of other people towards doctors may help reduce the pressure from parents on a student's decision to pursue medicine rather than what they want.

Good family relationships also serve as a protective factor against depression. Raising awareness and providing knowledge about childhood-nurturing and how to deal with adolescents are important keys to improving this risk factor. Having mindful thoughts, especially acceptancy skills, is also crucial in lowering the risk of depression. Mindfulness-based therapy is recommended as an alternative treatment for students who have depression.

## List Of Abbreviations

PHQ-9

9-item Patient Health Questionnaire

PHLMS

Philadelphia Mindfulness Scale

GPAX

Grade point average

PRIME-MD

Primary Care Evaluation of Mental Disorders

DSM

Diagnostic and Statistical Manual of Mental Disorders

MBSR

Mindfulness-based stress reduction

MBCT

Mindfulness-based cognitive therapy

M.I.N.I.

Mini International Neuropsychiatric Interview

## Declarations

### Ethics approval and consent to participate

All the study and methods used were conducted in accordance with relevant guidelines and regulations. The study was approved by the Institutional Review Board of the Faculty of Medicine Siriraj Hospital, Mahidol University (registration number: 559/2561(EC3)). This cross-sectional study was conducted in

September 2019 and the 2nd year medical student of Siriraj Medical School was invited to participate. Informed consent was obtained from all participants after the aims and objectives of the study had been explained. Each participant voluntarily decided to join the study.

### **Consent for publication**

Not applicable

### **Availability of data and materials**

The datasets generated and/or analysed during the current study are not publicly available due to protection of participant confidentiality. To request the data, please contact the corresponding author.

### **Competing interests**

All authors declare no competing interests

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### **Authors' contributions**

TW collected the data and wrote the manuscript. CS analyzed the data and wrote the manuscript. NS reviewed literatures and providing expert advice. LT collected the data and analyzed the data. YD wrote the manuscript and proofread the manuscript. All authors reviewed the final manuscript.

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### **Authors' information**

1. Tattiya Wisanuyothin (First author): Faculty of Medicine Siriraj Hospital, Mahidol University
2. Chinnawudh Sawee: Faculty of Medicine Siriraj Hospital, Mahidol University
3. Nattha Saisavoey: Department of Psychiatry, Faculty of Medicine Siriraj Hospital, Mahidol University
4. Lakkana Thongchot: Department of Psychiatry, Faculty of Medicine Siriraj Hospital, Mahidol University
5. Yodying Dangprapai (Corresponding author): Department of Physiology, Faculty of Medicine Siriraj Hospital, Mahidol University

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