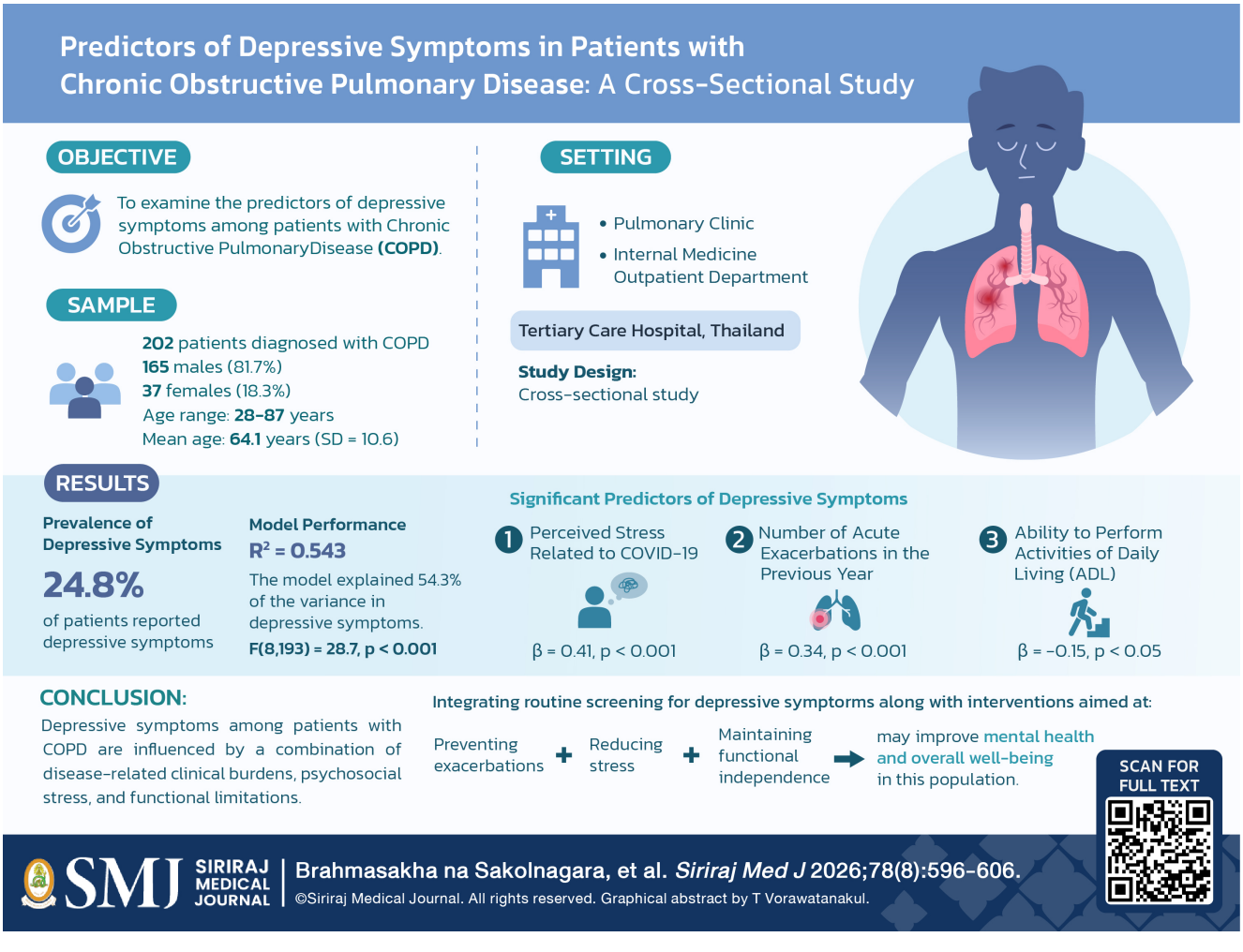
Predictors of Depressive Symptoms in Patients with Chronic Obstructive Pulmonary Disease: A Cross-Sectional Study

Wichaya Brahmasakha na Sakolnagara, R.N., M.N.S.[1,2], Atittaya Pornchaikate Au Yeong, R.N., Ph.D.[2,*], Wareerat Thanoi, R.N., Ph.D.[2], Sudarat Pianchob, R.N., Ph.D.[2]

[1]Master of Nursing Science Program in Psychiatric and Mental Health Nursing, Faculty of Nursing, Mahidol University, Bangkok 10700, Thailand,

[2]Department of Mental Health and Psychiatric Nursing, Faculty of Nursing, Mahidol University, Nakhon Pathom 73170, Thailand.



**Corresponding author: Atittaya Pornchaikate Au Yeong*
E-mail: atittaya.auy@mahidol.ac.th
Received 29 April 2026 Revised 3 June 2026 Accepted 18 June 2026
ORCID ID: http://orcid.org/0000-0002-2802-3384
https://doi.org/10.33192/smj.v78i8.281935

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ABSTRACT

Objective: This study aimed to examine predictors of depressive symptoms among patients with chronic obstructive pulmonary disease (COPD).

Materials and Methods: A cross-sectional study was conducted among 202 patients diagnosed with COPD, with dyspnea severity ranging from stage 0 to 3 according to the modified Medical Research Council Dyspnea Scale. Participants were recruited from the pulmonary clinic and internal medicine outpatient department of a tertiary care hospital in Thailand. The majority of participants were male (81.7%), with ages ranging from 28 to 87 years. Data were collected using demographic and standardized questionnaires assessing depressive symptoms, perceived stress to COVID-19, functional ability in activities of daily living, social support, coping strategies, duration of illness, and severe acute exacerbation. Descriptive statistics and multiple linear regression were used for data analysis.

Results: Overall, 24.8% of participants reported having depressive symptoms. The regression model explained 54.3% of the variance in depressive symptoms ($R^2 = 0.543$; $F(8,193) = 28.7$, $p < 0.001$). Three variables were identified as significant predictors: perceived stress related to COVID-19 ($\beta = 0.41$, $p < 0.001$), number of acute exacerbations in the previous year ($\beta = 0.34$, $p < 0.001$), and ability to perform activities of daily living ($\beta = -0.15$, $p < 0.05$).

Conclusions: Depressive symptoms among patients with COPD are influenced by a combination of disease-related clinical burdens, psychosocial stress, and functional limitations. Integrating routine screening for depressive symptoms along with interventions aimed at preventing exacerbations, reducing stress, and maintaining functional independence may improve mental health and overall well-being in this population.

Keywords: Ability to perform activities of daily living; chronic obstructive pulmonary disease; depressive symptoms; number of acute exacerbations; perceived stress related to COVID-19 (Siriraj Med J 2026;78(8):596-606)

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a major non-communicable disease and one of the leading causes of mortality worldwide. According to the World Health Organization, COPD is the third leading cause of death globally, following ischemic heart disease and stroke.[1] Beyond its respiratory manifestations, COPD substantially impairs physical functioning, quality of life, and psychological well-being. Among its psychological consequences, depressive symptoms are particularly common. A systematic review and meta-analysis of 79 studies conducted across 25 countries between 2000 and 2022 reported a pooled prevalence of depressive symptoms of 34.5% among patients with COPD. Furthermore, patients with COPD were 3.53 times more likely to experience depressive symptoms than individuals without COPD.[2]

Depressive symptoms in patients with COPD have been associated with a range of demographic, clinical, and psychosocial factors. Previous studies have identified older age, longer disease duration, frequent acute exacerbations, and impaired ability to perform activities of daily living as important clinical correlates of depressive symptoms.[3-7] Disease progression and recurrent exacerbations often worsen respiratory symptoms and physical limitations, leading to reduced independence and increased psychological burden. In addition, psychosocial stressors, including perceived stress related to the COVID-19 pandemic, have been associated with poorer mental health outcomes among patients with COPD.[8-10]

Psychosocial resources also play an important role in psychological adjustment to chronic illness. Social support has consistently been identified as a protective factor against depression, whereas inadequate support may increase feelings of loneliness, insecurity, and emotional distress.[11] Similarly, coping strategies influence how individuals adapt to the challenges of living with COPD. Adaptive coping strategies have been associated with better psychological adjustment and quality of life, whereas maladaptive coping strategies have been linked to increased psychological distress and depressive symptoms.[12,13]

Despite growing recognition of the relationship between COPD and depression, evidence regarding factors associated with depressive symptoms remains inconclusive, particularly in Thailand, where empirical research is limited. Identifying factors associated with depressive symptoms in patients with COPD may facilitate early detection and inform the development of targeted psychosocial interventions. Therefore, this study aimed to identify the predictors of depressive symptoms among patients with COPD.

MATERIALS AND METHODS

Research design and participants

This cross-sectional study with a predictive correlational design was conducted among patients with COPD attending the pulmonary and internal medicine outpatient clinics of a tertiary care hospital in Bangkok, Thailand.

Participants

Participants were recruited using convenience sampling from patients attending the pulmonary clinic and internal medicine outpatient department. Eligible participants met the following inclusion criteria: (1) physician-confirmed diagnosis of COPD; (2) age ≥18 years; (3) ability to communicate in and understand the Thai language; (4) severity of breathlessness during daily activities classified as mMRC grades 0-3 according to the modified Medical Research Council (mMRC) Dyspnea Scale; and (5) for participants aged ≥60 years, absence of cognitive impairment, as indicated by a score of ≥9 on the Thai version of the General Practitioner Assessment of Cognition (GPCOG), as documented in medical records on the day of the outpatient visit.

Sample size calculation

The required sample size was calculated using the G*Power program, with multiple linear regression specified as the planned statistical analysis. The effect size was estimated based on the study by Khanthawichai[14], which reported a correlation between activities of daily living and depression among patients with COPD ($r = -0.34$). This correlation was converted to Cohen's f^2 ($f^2 = r^2/(1 - r^2)$), yielding an effect size of 0.13. Statistical power was set at 0.95, with a significance level (α) of 0.05. Based on these parameters and the inclusion of eight predictor variables, the required sample size was 183; allowing for 10% incomplete data, the target sample size was 202 participants.

Data collection

Data collection was conducted at the pulmonary and internal medicine outpatient clinics. Following ethical approval, registered nurses screened potential participants according to the inclusion criteria and invited eligible patients to participate. All eligible patients agreed to participate, and no participants were excluded after enrollment. The researcher explained the study procedures and obtained informed consent prior to data collection. Participants completed a set of self-administered questionnaires, which required approximately 30 minutes to complete. They were informed that participation was voluntary and that they could withdraw from the study at any time without affecting their clinical care. Data were collected between September and December 2023.

Measures

Data were collected using standardized instruments. The scales were translated into Thai using a back-translation procedure to ensure linguistic and conceptual equivalence. The instruments include Perceived stress to COVID-19, Functional Performance Inventory, Multidimensional Scale of Perceived Social Support, Brief COPE Inventory and Patient Health Questionnaire

Sociodemographic and Health-Related Characteristics

Sociodemographic and health-related characteristics were collected using a 14-item questionnaire. Sociodemographic variables included sex, age, marital status, educational level, occupation, and income. Health-related variables comprised smoking history, history of COVID-19 infection and vaccination, COPD severity, duration of illness, and number of acute exacerbations. Participants completed the questionnaire independently.

Duration of Illness

Duration of illness was defined as the number of years since a physician confirmed the diagnosis of COPD. This variable was assessed using a self-report item in which participants indicated the duration in years and months since diagnosis.

Number of Acute Exacerbations

Number of acute exacerbations in the previous year was defined as the number of emergency department visits or hospitalizations due to COPD exacerbations across all healthcare facilities within the preceding 12 months. This was assessed using a self-report item with response options of "never" or "yes". Participants who responded "yes" were asked to specify the number of exacerbation events.

Perceived Stress to COVID-19

Perceived stress to COVID-19 was measured using a modified version of the Perceived Stress Scale adapted by Tripathi[15] from the original scale developed by Cohen et al.[16] The scale comprises 10 items rated on a 3-point Likert scale (0–2), with total scores ranging from 0 to 20. Higher scores indicate greater perceived stress related to COVID-19. The scale demonstrated acceptable internal consistency, with Cronbach's alpha values of 0.75 in the pilot testing phase and 0.74 in the study sample.

Functional Performance Inventory

The Functional Performance Inventory, developed by Leidy[13] and translated into Thai by Witeethamsaks et al.[17], was used to assess the ability of patients with COPD to perform daily activities. The instrument consists of 32 items rated on a 4-point Likert scale (1–4), with total scores ranging from 32 to 128. Higher scores indicate better functional performance in daily activities. The scale demonstrated good reliability, with Cronbach's alpha coefficients of 0.86 in a previous Thai study and 0.98 in the present study.

Multidimensional Scale of Perceived Social Support

The Multidimensional Scale of Perceived Social Support was developed by Zimet et al.[18] and translated into Thai by Wongpakaran et al.[19] It is designed to assess perceived social support from family, friends, and significant others. The scale comprises 12 items rated on a 7-point Likert scale (1–7), with total scores ranging from 12 to 84; higher scores indicate greater perceived social support. The scale demonstrated good internal consistency, with Cronbach's alpha values of 0.88 in previous studies and 0.87 in the present sample.

Brief COPE Inventory

The Brief COPE Inventory was developed by Carver[20] and translated into Thai by Numsang.[21] The instrument consists of 28 items representing 14 coping strategies, rated on a 4-point Likert scale (1–4), with total scores ranging from 28 to 112. It is categorized into two dimensions: problem-focused coping and emotion-focused coping.[22,23] Higher scores indicate a greater tendency to use coping strategies. Cronbach's alpha coefficients in the present study were 0.89 for problem-focused coping and 0.60 for emotion-focused coping.

Patient Health Questionnaire (PHQ-9)

PHQ-9, used to assess depressive symptoms, was developed by Kroenke et al.[24] and translated into Thai by Lotrakul and Sukanich.[25] The instrument comprises nine items assessing depressive symptoms over the previous two weeks, rated on a 4-point Likert scale (0–3), with total scores ranging from 0 to 27. Higher scores indicate greater severity of depressive symptoms. Scores are also categorized as none (0–7), mild (8–12), moderate (13–18), or severe (19–27) depressive symptoms. The scale demonstrated good internal consistency, with Cronbach's alpha values of 0.79 in previous Thai studies and 0.93 in the present study.

Ethical considerations

This study was conducted in accordance with the Declaration of Helsinki. The study protocol was approved by the Ethics Review Committee for Research Involving Human Subjects, Faculty of Nursing, Mahidol University (COA No. IRB-NS 2023/776.1905), and by the Human Research Ethics Committee of Bhumibol Adulyadej Hospital (IRB No. 70/66). Participation was entirely voluntary. Written informed consent was obtained from all participants prior to data collection. Participants were informed of their right to refuse participation or withdraw from the study at any time without penalty or any effect on their clinical care. All data were collected anonymously, and confidentiality was strictly maintained. Questionnaire data were stored on a password-protected computer accessible only to the principal investigator. Data will be retained for five years after study completion and subsequently destroyed in accordance with institutional ethical guidelines.

Statistical analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize participants' demographic and clinical characteristics as well as study variables. Bivariate relationships between independent and dependent variables were examined using Pearson's product–moment correlation coefficients. Multiple linear regression analysis was performed to identify predictors of depressive symptoms. Prior to regression analysis, the assumptions of linearity, independence of errors, homoscedasticity, normality of residuals, absence of multicollinearity, and absence of influential outliers were assessed and found to be satisfactory. Statistical significance was set at $p < 0.05$.

RESULTS

Sociodemographic and Health-Related Characteristics

A total of 202 participants were included in the study. The sample was predominantly male (81.7%) and consisted largely of older adults, with 62.4% aged over 60 years and a mean age of 65.6 years (SD = 11.4). Most participants were married (63.4%), had completed primary education (42.1%), and were unemployed or retired (59.8%), reflecting a largely older, post-working population. Regarding health-related characteristics, approximately half of the participants reported a history of COVID-19 infection, whereas the vast majority (96.5%) had received COVID-19 vaccination. Most participants had a history of smoking (72.3%), though 9.9% were current smokers, suggesting a substantial cumulative exposure to tobacco among the study population (Table 1).

TABLE 1. Sociodemographic and health-related characteristics (n = 202).

Characteristics	N (%)
Sociodemographic characteristics	
Gender	
Male	165 (81.7)
Female	37 (18.3)
Age (year)	
18–29	1 (0.5)
30–39	3 (1.5)
40–49	17 (8.4)
50–59	55 (27.2)
60–69	41 (20.3)
70–79	62 (30.7)
≥80	23 (11.4)
(Mean = 65.6, SD = 11.4, Min = 28, Max = 87)	
Marital status	
Single	35 (17.3)
Married	128 (63.4)
Divorced	19 (9.4)
Widowed	20 (9.9)
Educational Level	
Primary education	85 (42.1)
Secondary education	49 (24.3)
Diploma/Vocational certificate	16 (7.9)
Bachelor's degree	47 (23.2)
Postgraduate degree	5 (2.5)
Occupation	
Government or state enterprise employee	24 (11.9)
Private sector employees	6 (3)
General employees/Daily wage workers	28 (13.9)
Self-employed/Business owner	23 (11.4)
Unemployed/Retired	121 (59.8)
Health-related characteristics	
History of COVID-19 infection	
Yes	101 (50)
No	101 (50)
History of COVID-19 vaccination	
Vaccinated	195 (96.5)
Unvaccinated	7 (3.5)

TABLE 1. Sociodemographic and health-related characteristics (n = 202). (Continued)

Characteristics	N (%)
History of smoking	
Never smoked	36 (17.8)
Former smoker (years since smoking cessation)	146 (72.3)
< 1 year	10 (5)
1-5 years	44 (21.8)
6-10 years	32 (15.8)
11-15 years	16 (7.9)
16-20 years	15 (7.4)
> 20 years	29 (14.4)
(Mean = 9.70, SD = 12.42, Min = 0, Max = 60)	
Current smoker (cigarettes/day)	20 (9.9)
< 5 cigarettes/day	0 (0)
5-10 cigarettes/day	20 (9.9)
(Mean = 8.37, SD = 2.29, Min = 5, Max = 10)	
Severity of COPD (mMRC grades)	
Grade 0	20 (9.9)
Grade 1	75 (37.1)
Grade 2	52 (25.7)
Grade 3	55 (27.3)
Grade 4	0 (0)
Duration of illness (year)	
1 – 5	83 (41.1)
6 – 10	48 (23.8)
11 – 20	52 (25.7)
> 20	19 (9.4)
(Mean = 10, SD = 8.3, Min = 1, Max = 32)	
Number of acute exacerbations in the previous year (number of events)	
Never	121 (59.9)
Ever	81 (40.1)
1 – 2	43 (21.3)
3 – 5	33 (16.3)
> 5	5 (2.5)
(Mean = 1.1, SD = 1.7, Min = 0, Max = 7)	
Depressive symptoms	
No	152 (75.2)
Yes	50 (24.8)
Low	27 (13.4)
Moderate	18 (8.9)
Severe	5 (2.5)
(Mean = 4.8, SD = 5.3, Min = 0, Max = 27)	

Participants had been diagnosed with COPD for an average of 10 years (SD = 8.3) and reported a mean of 1.1 acute exacerbations in the previous year (SD = 1.7). Perceived stress related to the COVID-19 pandemic was relatively low, with a mean score of 4.6 (SD = 3.2). The mean score for the ability to perform activities of daily living was relatively high at 95.8 (SD = 22.0). The mean social support score was 51.4 (SD = 15.6). Regarding coping strategies, the mean score for problem-focused coping was 17.0 (SD = 4.4), whereas the mean score for emotion-focused coping was 46.7 (SD = 6.7). In terms of depressive symptoms, 24.8% of participants reported the presence of depressive symptoms, with 2.5% classified as having severe symptoms. Overall, participants exhibited relatively mild depressive symptoms, with a mean score of 4.8 (SD = 5.3) (Tables 1 and 2).

Clinical and Psychosocial Correlates of Depressive Symptoms in Patients with COPD

Pearson's product–moment correlation analysis was performed to examine the associations between clinical and psychosocial variables and depressive symptoms. Age ($r = 0.24$, $p < 0.01$), number of acute exacerbations in the previous year ($r = 0.56$, $p < 0.01$), and perceived stress related to COVID-19 ($r = 0.58$, $p < 0.01$) were positively correlated with depressive symptoms. In contrast, the ability to perform activities of daily living ($r = -0.55$, $p < 0.01$), social support ($r = -0.24$, $p < 0.01$), and problem-focused coping strategies ($r = -0.20$, $p < 0.01$) were negatively correlated with depressive symptoms. No significant correlations were observed between depressive symptoms and duration of illness ($r = 0.12$, $p = 0.10$) and emotion-focused coping strategies ($r = 0.11$, $p = 0.13$) (Table 3).

Predictors of Depressive Symptoms Among Patients with COPD

Multiple linear regression analysis using the enter method was performed to identify predictors of depressive symptoms among patients with COPD. The overall model was statistically significant and explained 54.3% of the variance in depressive symptoms ($R = 0.737$, $R^2 = 0.543$; $F(8,193) = 28.7$, $p < 0.001$). The number of acute exacerbations in the previous year ($\beta = 0.34$, $p < 0.001$), perceived stress to COVID-19 ($\beta = 0.41$, $p < 0.001$), and ability to perform activities of daily living ($\beta = -0.15$, $p < 0.05$) were significant predictors of depressive symptoms among patients with COPD. In contrast, age ($\beta = 0.04$, $p = 0.51$), duration of illness ($\beta = 0.03$, $p = 0.64$), social support ($\beta = -0.04$, $p = 0.49$), problem-focused coping strategies ($\beta = -0.08$, $p = 0.13$), and emotion-focused coping strategies ($\beta = -0.02$, $p = 0.77$) were not significantly associated with depressive symptoms (Table 4).

DISCUSSION

A total of 202 patients with COPD participated in the study. The majority were male (81.7%), older adults (mean age = 65.6 years), married (63.4%), had primary-level education (42.1%), and were unemployed or retired (59.8%). These findings are consistent with the global epidemiology of COPD, which indicates a higher prevalence among men than women, likely due

TABLE 2. Descriptive statistics of the study variables (n = 202).

Variables	Range		Mean (SD)
	Possible Range	Actual Range	
Age	≥18	28 – 87	65.6 (11.4)
Duration of illness	≥1	1 – 32	10 (8.3)
Number of acute exacerbations in the previous year	≥0	0 – 7	1.1 (1.7)
Perceived stress to COVID-19	0 – 20	0 – 13	4.6 (3.2)
Ability to perform daily activities	32 – 128	38 – 128	95.8 (22.0)
Social Support	12 – 84	15 – 84	51.4 (15.6)
Problem-focused coping strategies	6 – 24	6 – 24	17.0 (4.4)
Emotional-focused coping strategies	22 – 88	34 – 64	46.7 (6.7)
Depressive symptoms	0 – 27	0 – 27	4.8 (5.3)

TABLE 3. Correlations between clinical and psychosocial variables and depressive symptoms (n = 202).

Variables	1	2	3	4	5	6	7	8
1. Age								
2. Duration of illness	.292**							
3. No. of acute exacerbations	.098	.102						
4. Perceived stress to COVID-19	.122	−.015	.286**					
5. Ability to perform ADL	−.488**	−.213**	−.475**	−.446**				
6. Social Support	−.320**	.006	−.291**	−.038	.339**			
7. Problem-focused coping	−.296**	−.190**	−.159*	.007	.292**	.237**		
8. Emotional-focused coping	−.021	−.255**	−.005	.315**	−.092	.085	.108	
9. Depressive symptoms	.240**	.116	.556**	.576**	−.552**	−.235**	−.203**	.107

$^{**}p < 0.01$, $^{*}p < 0.05$

TABLE 4. Multiple linear regression analysis of predictors of depressive symptoms among patients with COPD (n = 202).

Variables	b	S.Eb	β	t	*P*-value
constant	5.327	3.917		1.360	.175
Age	.019	.028	.040	.663	.508
Duration of illness	.016	.035	.025	.470	.639
Number of acute exacerbations	1.069	.184	.336	5.812	.000***
Perceived stress to COVID-19	.701	.099	.414	7.089	.000***
Ability to perform daily activities	-.036	.017	-.148	-2.080	.039*
Social Support	-.013	.019	-.038	-.693	.489
problem-focused coping strategies	-.098	.064	-.081	-1.535	.126
emotional-focused coping strategies	-.013	.043	-.016	-.295	.768

Adjusted $R_2 = .524$, $R_2 = .543$, $F = 28.71$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$. Durbin-Watson = 1.768

to greater tobacco exposure and occupational respiratory hazards among males.[26-28] Most participants had a history of smoking (72.3%), while 9.9% were current smokers, consistent with evidence that COPD is more common among former and current smokers than among never smokers.[26]

Depressive symptoms are common among patients with COPD, with reported prevalence ranging from 15% to 40%, higher than in many other chronic conditions.[9,29,30] Depression in COPD has been associated with poorer clinical outcomes, increased exacerbation risk, reduced quality of life, and higher mortality.[9,31] In the present study, 24.8% of participants reported depressive symptoms, including 2.5% with severe depression. This prevalence is comparable to a previous study in Southern Thailand reporting a higher prevalence of 37.8%[32], and may reflect the substantial psychological burden and functional impairment associated with COPD. These findings highlight the importance of routine screening and early identification of depressive symptoms in clinical practice, as well as the need for integrated mental health management within COPD care pathways.

In this study, six factors were significantly associated with depressive symptoms. Age, number of acute exacerbations in the previous year, and perceived stress related to COVID-19 were positively associated with depressive symptoms, whereas activities of daily living (ADL) ability, social support, and problem-focused coping were negatively associated. These findings suggest that older age, more frequent exacerbations, higher COVID-19 related stress, poorer functional ability, lower social support, and less use of problem-focused coping strategies may increase vulnerability to depressive symptoms in patients with COPD. Overall, both clinical severity and psychosocial resources should be considered in the assessment and management of depressive symptoms in this population.

Multivariable regression analysis identified three independent predictors of depressive symptoms: perceived COVID-19 related stress, number of acute exacerbations, and ADL ability. Perceived COVID-19 stress was the strongest predictor ($\beta = 0.41$, $p < 0.001$). Although the acute phase of the pandemic has subsided, patients with COPD may continue to perceive heightened vulnerability to infection and severe outcomes. Biological susceptibility, including increased angiotensin-converting enzyme 2 expression in airway epithelial cells, may reinforce these concerns.[9] In addition, perceived vulnerability may lead to avoidance of social activities, contributing to isolation, loneliness, and psychological distress, which are known risk factors for depression.[30]

Frequent acute exacerbations were also a significant predictor ($\beta = 0.34$, $p < 0.001$). Exacerbations worsen dyspnea and may trigger anxiety, creating a reciprocal cycle in which anxiety intensifies breathlessness perception. Recurrent exacerbations and related healthcare utilization may therefore contribute to sustained psychological distress and increased risk of depression.[31,33] This finding may be particularly relevant in the present study, in which most participants were older adults who may be more vulnerable to functional decline and emotional distress following exacerbations.

Finally, functional limitations were associated with depressive symptoms. Lower ability to perform activities of daily living was associated with higher depressive symptoms ($\beta = -0.15$, $p < 0.05$). Functional impairment in COPD can restrict physical, psychological, and social participation, contributing to reduced autonomy and increased emotional distress.[7,34] In the present study, where most participants were older adults, declining functional capacity may also increase dependence on caregivers and reduce perceived self-efficacy, thereby increasing vulnerability to depressive symptoms.

In contrast, age, social support, and coping strategies were not significant predictors in the multivariable model. This may be explained by limited variability in social support, as most participants reported adequate family support. Additionally, long-term adaptation to illness and the use of multiple coping strategies over time may have attenuated the independent effects of coping and disease duration on depressive symptoms.

Overall, these findings suggest that depressive symptoms in COPD are most strongly associated with the combined effects of disease severity, functional impairment, and psychological stressors rather than demographic or isolated psychosocial factors. These results highlight the importance of integrated care approaches that address both physical and psychological needs, including prevention of exacerbations, maintenance of functional independence, and routine screening for depressive symptoms in patients with COPD.

Clinical implications

The present study found that approximately 24.8% of patients with COPD experienced depressive symptoms, including 2.5% with severe symptoms, and some participants reported thoughts of self-harm. These findings highlight the need for increased awareness among healthcare professionals regarding depression in COPD, as untreated depressive symptoms may adversely affect treatment adherence, quality of life, and clinical outcomes. Routine screening for depressive symptoms may therefore be warranted, particularly among patients with frequent exacerbations, elevated psychosocial stress, or reduced functional capacity. Early identification can facilitate timely psychological assessment and intervention, supporting more integrated and patient-centered care.

The identified predictors, frequent acute exacerbations, perceived stress related to COVID-19, and reduced ability to perform activities of daily living, suggest important targets for intervention. Clinical management should emphasize patient education on COPD self-management, including early recognition of exacerbation symptoms to reduce emergency visits. In addition, guidance on infection prevention and coping strategies during public health crises may help mitigate perceived stress. Interventions aimed at maintaining or improving functional independence may further contribute to better psychological outcomes.

Limitations

Certain limitations should be considered. First, participants were limited to those with mMRC dyspnea grades 0–3, as patients with grade 4 were excluded due to concerns regarding their ability to complete study procedures. This may have led to an underestimation

of depressive symptoms, as individuals with more severe functional impairment are likely at higher risk of depression. Second, the study was conducted in a tertiary care hospital setting, where patients typically have access to multidisciplinary care and specialist services. This may limit the generalizability of the findings to primary or secondary care settings or regions with different healthcare resources. Potential confounders of the association with depressive symptoms were considered. Key sociodemographic factors (e.g., age) and clinical characteristics (e.g., duration of illness, frequency of acute exacerbations) were included in the multivariable regression analysis to minimize confounding effects. Psychosocial variables such as perceived stress to COVID-19, ability to perform daily activities, social support, and coping strategies were also adjusted for in the final model. However, unmeasured factors, including medication effects, other physical and psychiatric comorbidities may have influenced the observed associations. Therefore, the results should be interpreted with consideration of these potential sources of residual confounding. Despite these limitations, the study provides useful evidence on factors associated with depressive symptoms in COPD and highlights the importance of integrating psychological assessment into routine respiratory care.

CONCLUSIONS

This study identified frequent acute exacerbations, perceived COVID-19–related stress, and reduced activities of daily living as significant predictors of depressive symptoms among patients with COPD. These findings suggest that depressive symptoms are influenced by the combined effects of clinical disease burden, functional impairment, and psychosocial stressors. Overall, the results support the integration of mental health screening into routine COPD management. Interventions focusing on exacerbation prevention, preservation of functional independence, and reduction of psychosocial stress may contribute to improved psychological well-being in this population.

Data Availability Statement

The data are not publicly available due to privacy and ethical restrictions imposed by the Institutional Review Board of Mahidol University, Thailand

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the participants and clinical staff for their invaluable support and contributions to this study.

DECLARATIONS

Grants and Funding Information

None.

Conflict of Interest

The authors declare no conflict of interest.

Registration Number of Clinical Trial

None.

Author Contributions

Conceptualization and Methodology: W.B.S. and A.P.A.; Investigation: W.B.S. and A.P.A.; Formal analysis: W.B.S. and A.P.A.; Data curation: W.B.S.; Writing original draft: W.B.S.; Validation and writing -review & editing: W.B.S., A.P.A., W.T., and S.P.; Supervision: A.P.A., W.T., and S.P. All authors have read and approved the final manuscript.

Use of Artificial Intelligence

The authors used AI to assist with language editing and enhance the clarity and academic quality of written work.

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