A Causal Model of Asthma Control in Adults

Patchanok Witheethammasak, Aporn Deenan, Khemaradee Masingboon*

Abstract: Asthma control is the goal of management to prevent exacerbations and minimize the severity of asthma. To design effective interventions to control asthma, understanding of factors involved and how they work to influence asthma control is needed. This cross-sectional study aimed to develop and test a causal model of asthma control in Thai adults with asthma. A sample of 330 participants were recruited from asthma and chronic obstructive pulmonary disease clinics in four tertiary hospitals in eastern Thailand. Data were collected using a sociodemographic form; the Brief Illness Perception Questionnaire; the Hospital Anxiety and Depression Scale; Job Stress Scale; the Multidimensional Scale of Perceived Social Support; the Functional, Communicative, and Critical Health Literacy Scale; the Self-Efficacy Subscale of the Knowledge, Attitude, and Self-Efficacy Asthma Questionnaire; the Asthma Self-Management Behavior Instrument; and the Asthma Control Questionnaire. Structural Equation Modeling was used to test the asthma control model.

After trimming the initial model, the final model explained 54% of the total variance in asthma control with self-management behaviors having the strongest direct effect. Health literacy, illness perception, and social support indirectly affected asthma self-management behaviors through asthma self-efficacy, then directly affected its control. Illness perception, depression, and social support indirectly affected asthma control via asthma self-management behaviors, whereas job stress directly and indirectly affected asthma control via asthma self-management behaviors. The results suggest that nurses can design an intervention to support asthma self-management behaviors by enhancing asthma self-efficacy through increasing health literacy, improving illness perception and social support, and reducing job stress and depression. This intervention should be combined with innovative technology and further tested for its effectiveness.

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Introduction

Asthma is a significant chronic non-communicable disease with increasing prevalence, and negatively impacts the health of people and health care systems worldwide.[1,2] Although asthma affects people of all ages, its severity is greater in adults than in younger people

and it progresses more rapidly in adults by impairing lung function and obstructing airflow.[3] Adults with asthma often have severe asthma and high mortality.[3] The typical symptoms of asthma in adults often appear in clusters that are complex and persistent.[2] Most adults with asthma have poor asthma control; consequently, many have exacerbations that require hospitalization.[4] In addition, asthma in adults can create a socioeconomic burden associated with the direct expenditure of families and the health care system.[1] Thus, asthma control is the goal of asthma management to prevent exacerbations and minimize morbidity.[2]

According to the standard treatment guidelines, asthma control in adults worldwide has not yet reached an adequate level of control in actual practice.[5] In Thailand, only 8% of adults with asthma are classified as having this effectively controlled even though they have received treatment according to the guidelines.[4] Thus, a better understanding of internal and external factors associated with effective asthma control in adults is needed. Several studies have shown that cognitive variables are related to asthma control, including the perception of the illness, health literacy,[6,7] social support, and self-efficacy.[8,9] Adhering to essential self-management behaviors leads to efficient asthma control.[10] Depression is also common among adults with asthma and it worsens asthma symptoms and treatment.[11] Among working adults, it has been shown that a job with strict time constraints and increased stress can induce severe asthma symptoms.[12]

However, there is little evidence of adult asthma control research in Thailand. Previous studies have reported relationships between asthma control and single or few factors, but the results were insufficient to guide effective interventions in controlling asthma in Thai adults. Few researchers have examined the simultaneous relationships among multiple factors and their impact on asthma control.[6-10] Thus, the current study developed and tested a causal model to explain the complex relationships among multiple factors related to asthma control in adults with asthma. It is anticipated that the results will be the basis for developing interventions to improve asthma control.

Conceptual Framework and Literature Review

The Individual and Family Self-Management Theory (IFSMT)[13] guided this study by providing a framework for understanding asthma control in adults. The IFSMT explains factors that influence individual and family self-management for better outcomes. Based on the IFSMT, self-management is a complex dynamic phenomenon consisting of three dimensions: context (condition-specific factors, physical and social environment, individual and family factors), process (knowledge and beliefs, self-regulation skills and abilities, social facilitation), and outcomes. Outcomes in this theory are both proximal (self-management behaviors, cost of health care services) and distal (health status, quality of life, cost of health).[13] Our study focused on both proximal and distal outcomes regarding self-management behaviors and asthma control, respectively. Self-management behaviors and asthma control may be influenced directly and indirectly by the context and process dimensions.[13]

In controlling asthma in adults, the context dimension is related to condition-specific factors, physical and social environment, and individual and family factors.[13] Previous studies have shown that the impact on asthma control from context dimensional factors may be preventable or modifiable, such as related-illness perceptions, depression, job stress, social support, and health literacy. The complexities of asthma or its medical treatment, known as condition-specific factors, may influence people's necessary behaviors to manage their condition because asthma may present a variety of symptoms in both stable and relapse phases.[13] Illness perception is defined as the extent to which adults with asthma perceive the presence of their disease.[14]

Health problems impact both cognition and emotion in that illness perception in patients may be altered to address concerns about asthma and coping with the disease. Negative illness perception about disease severity, inadequate asthma control, and poor understanding of asthma can lead to decreased self-efficacy, which is the confidence that adults have in managing their asthma.[15] Adults who have lived with asthma for an extended period may become accustomed to their symptoms. However, failure to control asthma will increase and worsen the symptoms.[5,16] Uncontrolled emotion-related illness can trigger asthma symptoms that lead to poor asthma control.[12] Long-term illness may cause specific alterations in cognition and emotion with patients experiencing depressive symptoms, such as feelings of loneliness, worthlessness, and helplessness.[11] A psychological asthmatic trigger can induce poor asthma control and cause decreased self-management that affects treatment approaches.[9,11]

The context dimension of IFSMT involves physical and social environment factors. These include health care access, transportation, neighborhoods, job, culture, and social capital that support or impede self-management.[13] Adults with asthma who are employed often work under job conditions that create pressure and anxiety. High job stress increases the inflammation of the airways and makes people more sensitive to asthmatic triggers that can induce more severe symptoms that are difficult to control.[12,17] Working with time pressures also affects the monitoring of symptoms and their management.[18] Moreover, adults with asthma who perceive low social support may experience negative emotions that can trigger asthma symptoms.[12] Social support is the assistance or comfort that adults perceived they have available to them.[19] As part of the social environment, social support from family, friends, and significant others promotes self-management behaviors and influences asthma control.[18]

The context dimension of individual and family factors also impacts asthma control.[13] Health literacy is the ability to obtain, understand, and use health information and services.[20] Adults with asthma with a higher degree of health literacy have better access to resources and the ability to analyze and apply knowledge to their situation, thus resulting in increased self-management confidence.[21] Lower health literacy may potentially induce dangerous asthma attacks because of no warning signs and delay in seeking early treatment.[6] They may have less accurate metered-dose inhaler techniques and decreased desire to participate in decision-making, both of which are barriers to achieving asthma self-management.[21]

Process and proximal outcomes dimensions are also important for asthma control.[13] Self-efficacy, a factor in the process dimension, influences asthma control.[8,18] Adults with asthma who have higher asthma self-efficacy have fewer asthma symptoms, confidence in doing activities, reduction of emotional pressures, and awareness of their power and ability to adhere to appropriate self-management behaviors, which is a proximal outcome dimension.[8,22] Additionally, asthma control is the reduction or absence of symptoms and the prevention of exacerbations of asthma through effective disease management,[2] a factor in the distal outcomes dimension. This is more complex with proximal outcomes related to self-management behaviors. These include participation in activities or treatments, symptom management, usage of suggested medications, and environment control in daily life.[10,13,23,24,25]

To portray the complexity of asthma control, this study incorporated both direct and indirect relationships among variables in a hypothesized model based on a review of the literature **(Figure 1)**. The arrows in the model represent the causal sequence and the expected direction of effects between illness perception, depression, job stress, social support, health literacy, asthma self-efficacy, and asthma self-management behaviors leading to asthma control in adults with asthma.

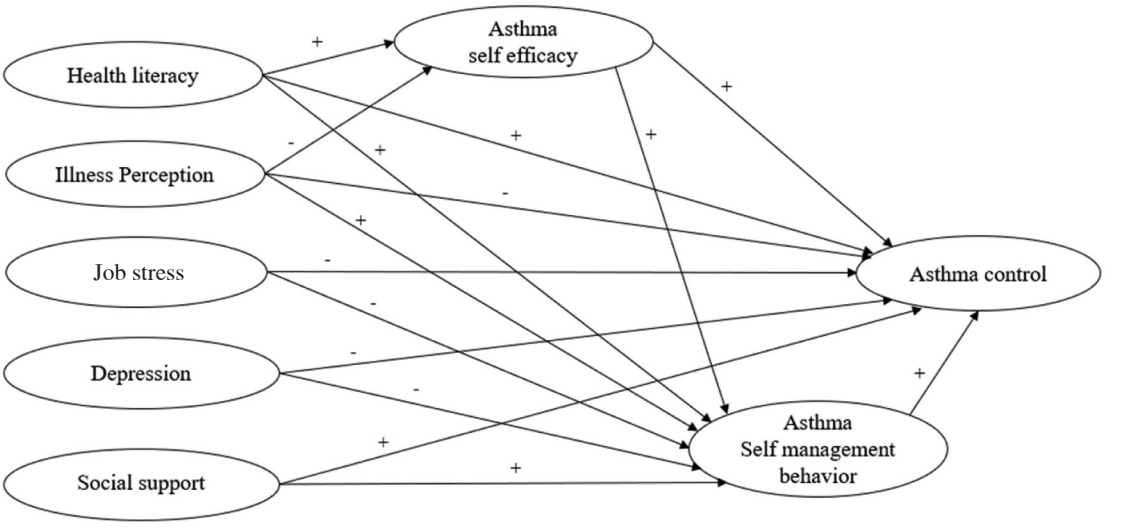


Figure 1. The hypothesized model of asthma control in adults with asthma

Study Aim

This study aimed to develop and test the causal relationships between illness perception, depression, job stress, social support, health literacy, asthma self-efficacy, asthma self-management behaviors, and asthma control among adults with asthma.

Methods

Study Design: A cross-sectional design was used in this study. The report of the research follows the STROBE cross-sectional guidelines.

Sampling and Setting: A sample of 330 participants was recruited from asthma and COPD clinics in the outpatient departments of four tertiary hospitals in eastern Thailand. A sample size of 300 participants was deemed adequate for the statistical power of the structural equation modeling (SEM).[26] However, to compensate for possible attrition, an additional 10% were recruited for a total of 330 participants.[26]

Participants were selected by the cluster sampling technique because there was no complete list or single source of all the people with asthma to recruit a sufficient sample size. First, the primary investigator (PI) identified asthma and COPD clinics in six tertiary hospitals in eastern Thailand. Second, the names of four of the six hospitals were drawn using a simple random sampling technique with a ratio of 2:3. Finally, convenience sampling was used to select 82 or 83 eligible participants from each hospital. All 330 adults with asthma who visited the hospital on the day of data collection were recruited based on the following inclusion criteria: 1) aged 20 to 60 years, 2) able to communicate in Thai, 3) no asthma symptoms that would affect their ability to complete the self-administered questionnaire, 4) no history of COPD, congestive heart failure, advanced lung carcinoma, or other disability/conditions that limited their movement, and 5) normal cognitive function that was evaluated based on a score between 3 and 5 of the Mini-Cog.[27]

Instruments: Data were collected by using nine self-administered questionnaires. The PI obtained permissions from the instrumental developers and translators before using them in this study, apart from the sociodemographic questionnaire, which was developed by the PI. Personal data were collected on gender, age, religion, marital status, education level, occupation, average monthly income, perceived sufficiency of income,

duration of illness, co-morbidity, history of visits to emergency rooms or hospital admissions during the past year from a severe asthmatic attack, asthma triggers, weight, height, and peak expiratory flow rate.

The Brief Illness Perception Questionnaire (Brief IPQ) was developed in English by Broadbent et al.[14] and translated to Thai by Sowattanangoon.[28] The 9-item Brief IPQ assesses illness perception that impacts the management of the condition. It has two dimensions: cognitive and emotional representation of illness. Eight items are scored on an 11-point scale from 0 (no impairment) to 10 (maximum impairment). An example is: "How much does your illness affect your life?" The three negatively worded items are reverse scored. Total scores to measure the degree of illness perception can range from 0 to 80. When applied to asthma control, higher scores indicate a person's higher perceived health threat to managing the condition. The ninth item is an open question for which participants rank the three primary causes of their illness;[14] however, this item was omitted from the current study. The Cronbach's alpha coefficient was.87 for the current study.

The Hospital Anxiety and Depression Scale-Depression Subscale (HADS-D) is a screening tool that quickly and effectively identifies people that show symptoms of depression. It was developed in English by Zigmond and Snaith[29] and translated to Thai by Nilchaikovit et al.[30] The HADS-D has seven items, each with a four-point response option that ranges from 0 (no impairment) to 3 (maximum impairment). An example is: "I feel as if I am slowed down." Total scores can range from 0 to 21 with higher scores indicating more severe depression. A score of seven or fewer points indicates an absence of depression.[29,30] The Cronbach's alpha coefficient was .75 for the current study.

The Job Stress Scale (JSS) was developed in English by Parker and DeCoittis[31] to measure job stress and translated into Thai by Jampong.[32] The 13-item JSS has two dimensions, including time pressure and job-related anxiety. Each item has a 5-point Likert response option that ranges from 1 (strongly disagree) to 5 (strongly agree), with a total score ranging from 13 to 65. An example is: "I felt fidgety or nervous as a result of my job." Higher scores indicate higher job stress.[31] The Cronbach's alpha coefficient was.91 for the current study.

The Multidimensional Scale of Perceived Social Support (MSPSS) measures social support. It was developed in English by Zimet et al.,[19] and revised and translated into Thai by Wongpakaran et al. (r-T-MSPSS).[33] The 12-item r-T-MSPSS has three dimensions: family, friends, and significant others. Each item is on a 7-point Likert-type scale from 1 (very strongly disagree) to 7 (very strongly agree). An example is: "My family really tried to help me." Total scores can range from 12 to 84 with higher scores indicating a higher perception of social support.[19] The Cronbach's alpha coefficient was .92 for the current study.

The Functional, Communicative, and Critical Health Literacy scale (FCCHL scale) measures health literacy in people with a chronic disease. It was developed in English by Ishikawa et al.[20] and translated into Thai by Maneesriwongul.[34] The 14-item FCCHL scale has three dimensions: functional health literacy, communicative health literacy, and critical health literacy. Each item has a 4-point response option that ranges from 1 (never) to 4 (often), with a total score ranging from 14 to 56. An example is: "You have collected information from various sources." Higher scores indicate higher health literacy.[20] The Cronbach's alpha coefficient was .86 for the current study.

The Self-efficacy subscale of the Knowledge, Attitude, and Self-efficacy Asthma Questionnaire (KASE-AQ) was developed by Wigal et al.[35] It is used to assess adult patients' self-efficacy in asthma management. The Self-efficacy subscale of the KASE-AQ has a total of 20 items, each with a 5-point response option from 1 (strongly disagree) to 5 (strongly agree). An example is: "I can do a great deal to solve the problems that asthma can cause." The two negative items are reverse scored with total scores ranging from 20 to l00. Higher scores indicate more confidence in managing asthma.[35] It was translated into Thai by the

PI using the back-translation method.[36] After obtaining the permission, the KASE-AQ was translated into Thai by two bilingual translators and the final version was confirmed by an expert panel. The English version was translated into Thai, then back-translated into English by the second bilingual translator who had not seen the original English version. Finally, three bilingual experts checked for content validity and appropriateness of language. The KASE-AQ Thai version obtained a content validity index of .92 and the Cronbach's alpha coefficient was .94 for the current study.

The Modified Asthma Self-Care Practice Instrument (AsSCPI) was used to assess self-management behaviors. It was developed in English by Fitzpatrick and Frey for use with adolescents[23] and translated into Thai by Preechawong.[24] The 22-item AsSCPI has four dimensions: symptom management, medical management, environment control, and overall. Each item has a response option ranging from 0 (never) to 10 (always).[24] An example is: "How much do you watch yourself for signs of asthma, such as wheezing, coughing, or trouble breathing?" Total scores can range from 0 to 220, with higher scores indicating that asthma management behaviors are performed more consistently. The PI adjusted some of the wording to be more appropriate for adults with asthma, for example changing "father, mother, and school" to "husband, family, and work." The Cronbach's alpha coefficient was .92 for the current study.

The Asthma Control Questionnaire (ACQ) was developed in English by Juniper et al.[37] to measure asthma control. The Thai version was made available from the Mapi Research Institute (Lyon, France). The 6-item version of ACQ has three dimensions: daytime and nighttime symptoms, activity limitation, and rescue bronchodilator use. Each item has a 7-point response option from 0 (no impairment) to 6 (maximum impairment). An example is: "In general, during the past week, how much shortness of breath did you experience because of your asthma?" Averaged total scores range from 0 to 6, with higher scores indicating poorer asthma control. A score ≥ 1.5 indicates a poorly controlled asthma.[37] The Cronbach's alpha coefficient was .85 for the current study.

Ethical Considerations: The study received approval from the institutional review board of Burapha University (G-HS 027/2563) and the Committee of Rights for Human Research of the four study hospitals (CTIREC-058, BSH-IRB 038/2563, IRB-BHUBEJHR-163, IRB 081/2563). After obtaining permission to conduct the study, the PI informed participants of the study's objectives, risks, benefits, voluntary participation, and confidentiality. Participants had the right to refuse to participate at any time during the study. They were asked to sign consent forms after receiving clear information. All data acquired from this study were kept confidential. Participants' names were assigned a code number to ensure confidentiality. The results were presented in the aggregate without using personal or institution identifiers.

Data collection: Data were collected from December 2020 through May 2021 by the PI and two research assistants. All research assistants were registered nurses with two or more years of experience in caring for adults with asthma. Before collecting data, they were given formal training in sample selection and collecting data using the questionnaires. The PI and research assistants selected participants who met the inclusion criteria based on their medical records. The participants completed the self-administered questionnaire and instruments in a private place about 45-60 minutes before meeting the physician. The participants could ask any questions during the process. After a participant finished, the PI and research assistants checked for the completeness of the data.

Data analysis: Means, standard deviations, frequencies, percentages, ranges, and distributions were used to describe demographic data and the study variables. Interval-level data were screened and tested for normality of distribution, multicollinearity, and multivariate outliers. Pearson's correlation coefficients were used to examine the relationships between the variables. Construct validity was investigated by using confirmatory factor analysis (CFA) on measurement models for eight variables. The SEM models were evaluated using multiple goodness-of-fit indices: Chi-square values (CMIN *P*-value > .05 and CMIN/

df < 2), goodness of fit index (GFI = .90-1.00), adjusted goodness of fit index (AGFI = .90-1.00), comparative fit index (CFI = .95-1.00), and root mean square error of approximation (RMSEA < .05). IBM® SPSS® with AMOS™ statistical software programs were used for data analysis. Throughout the analyses, the statistical significance level was set to $p < .05$.

Results

There were no missing data, and all interval-level data were normally distributed. Neither multicollinearity nor multivariate outliers were discovered. Of the 330 adults with asthma, their mean age was 45.6 years (SD = 9.11). Most participants were female (72.1%), married (61.8%) and had completed primary school (37.0%) or high school (31.8%). About a quarter of the participants (25.8%) were factory workers or machine operators; 16.1% were service workers; 14.8% were laborers; and half of them (50.6%) stated that their income was insufficient.

The average time since the adults' first asthma diagnosis was 10.5 years (SD = 8.82); more than half the participants had received an asthma diagnosis from 1 to 10 years (53.6 %) and had a comorbid condition (54.8%). Almost two-thirds of participants had never been admitted to an emergency room or hospitalized due to asthmatic symptoms in the past year (63.9%). The mean percentage of predicted peak expiratory flow rate of participants was 69.13 (SD = 25.78). Less than half of participants (47.3%) were in the moderate persistent group classification. More than half (58.7%) were classified as either overweight (44.5%) or obese (14.2%). Most had little or no depression (94.8%), but only 18.5% of the participants would be classified as having well asthma control. On average, they were not depressed (M = 3.56, SD = 2.46), but had poor asthma control (M = 1.59, SD = 0.97). The descriptive statistics of other variables are presented in **Table 1**. The correlations between the seven independent variables and the dependent variable are shown in **Table 2**. Correlation coefficients between all independent variables and asthma control ranged from r = -0.54 to 0.46.

Table 1. Descriptive statistics of study variables (n = 330)

Variables	Possible Range	Actual Range	*M*	*SD*	Level
Illness perception	0-80	0-65	32.8	12.28	Moderate
Depression	0-21	0-10	3.5	2.35	No depression
Job stress	13-65	13-62	34.7	10.43	Moderate
Social support	12-84	34-84	64.4	11.43	High
Health literacy	14-56	19-56	42.2	6.96	Moderately high
Asthma self-efficacy	20-100	39-100	73.6	12.44	Moderately high
Asthma self-management behaviors	0-220	32-206	118.6	33.20	Moderate
Asthma control	0-6	0-4.17	1.6	0.96	Poor control

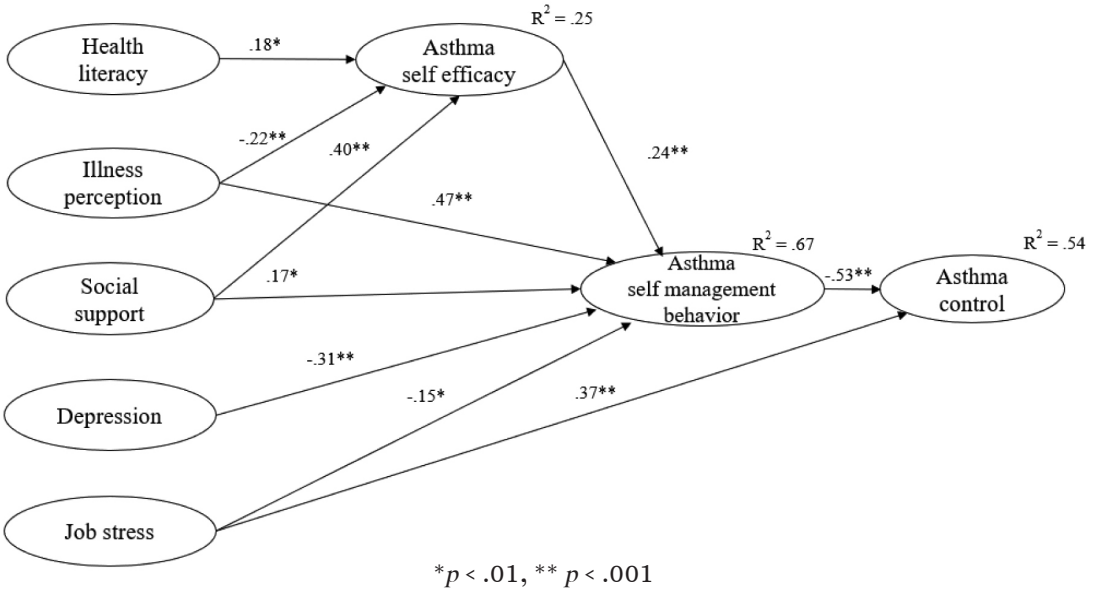
Table 2. Correlation matrix of study variables (n = 330)

Variables	1	2	3	4	5	6	7
1. Illness perception							
2. Depression	-.23**						
3. Job stress	.09	.35**					
4. Social support	.18**	-.48**	-.26**				
5. Health literacy	.00	-.18**	-.26**	.28**			
6. Asthma self-efficacy	-.12*	-.29**	-.24**	.29**	.38**		
7. Asthma self-management behaviors	.46**	-.60**	-.28**	.23**	.36**	.50**	
8. Asthma control	-.12*	.46**	.44**	-.17**	-.29**	-.36**	-.54**

*$p < .05$, **$p < .01$

The results indicate all measurement models had an acceptable overall model fit to the sample data. Confirmatory factor loadings were substantial and significant, ranging from .46 to .93 at the .05 level. Using SEM, the hypothesized structure model was evaluated. The initial results of testing the hypothesized model showed that the data did not fit the model well: the CMIN was 269.68 ($p < .001$, $df = 129$); CMIN/*df* was 2.091; GFI was .93; AGFI was .89; NFI was .90; CFI was .95; and RMSEA was .06.

As a result, the model was modified while considering the conceptual and modification indices. The model was trimmed serially by evaluating low standardized factor loadings and non-significant parameters. A path from social support to asthma self-efficacy was added based on modification indices based on the theoretical support and empirical evidence. The final model (**Figure 2**) yielded satisfactory goodness-of-fit indices: the CMIN was equal to 236.38 ($p < .001$, $df = 134$); CMIN/*df* was 1.76; GFI was .93; AGFI was .91; NFI was .92; CFI was .96; and RMSEA was .048. The final model of asthma control in adults with asthma explained 54% of the total variance.



$^*p < .01$, $^{**}p < .001$

Figure 2. The final model of asthma control for adults with asthma

Table 3 shows the direct effects of asthma self-management behaviors ($\beta = -.53$, $p < .001$) and job stress ($\beta = .37$, $p < .001$) on asthma control. The asthma self-management behaviors and asthma self-efficacy were mediating variables of the final model. The final model indicated that illness perception, depression, job stress, social support, and asthma self-efficacy had an indirect effect on asthma control through asthma self-management behaviors. In addition, health literacy, illness perception, and social support had an indirect effect on asthma control through asthma self-efficacy. The final model explained 54% of the variance in asthma control in adults with asthma.

However, the results indicated that illness perception, depression, job stress, social support, and asthma self-efficacy explained 67% of the variance in asthma self-management behaviors. Most of the variables had direct effects on asthma self-management behaviors but only indirect effects on asthma control through asthma self-management behaviors, which might indicate duplication in asthma control prediction.

Table 3. Parameter estimates of direct, indirect, and total effects of the hypothesized model (n = 330)

Variables	Asthma self-efficacy			Asthma self-management behaviors			Asthma control		
	DE	IE	TE	DE	IE	TE	DE	IE	TE
Illness perception	-.22***		-.22***	.46***	-.05**	.41**		-.22**	-.22**
Depression				-.31***		-.31***		.16*	.16*
Job stress				-.15**		-.15**	.37***	.08*	.45**
Social support	.40***		.40***	.17***	.10**	.27**		-.14**	-.14**
Health literacy	.18**		.18**		.05**	.05**		-.02**	-.02**
Asthma self-efficacy				.24***		.24***		-.13**	-.13**
Asthma self-management behaviors							-.53***		-.53***
	R^2 = .25			R^2 = .67			R^2 = .54		

Note: *p < .05, **p < .01, ***p < .001

DE = direct effect, IE = indirect effect, TE = total effect

Discussion

The results revealed that to control asthma in adults, several individual factors, both internal and external, may need to be considered. Based on the research results, asthma control might be concerned about the self-efficacy pathway, the self-management behaviors pathway, and job stress. These research results partially support the relationships among the constructs of the IFSMT.

Firstly, asthma self-efficacy acted as mediating variables between illness perception, social support, and asthma self-management behaviors. Self-efficacy may encourage adults with asthma confidence to overcome barriers in maintaining self-management behaviors, while illness perception promotes understanding of illness and self-management behaviors.[17] If they perceive that they understand their disease and are able to control it, they will be more confident in disease management.[28] Adults with asthma who have higher illness perception have better understand about illness and may acquire health information to apply the knowledge appropriate to their situations, thus increasing their self-efficacy for asthma management.[6,21] They might not practice asthma self-management if they believe that the absence of symptoms indicates a lack of the disease or become accustomed to minimal symptoms in daily life.[5,39] Moreover, an awareness of social support might encourage and empower, and motivate adults with asthma for practicing activities of asthma self-management, asthma prevention, and asthma control. It may also strengthen their ability to achieving asthma control,[18,22] preventing, or managing problems caused by asthma.[9,22] As a result, the combination of illness perception and social support might augment the confidence of adults with asthma to perform various activities to control asthma when dealing with the unpredictable nature of asthma.[9,17,22]

Secondly, asthma self-management behaviors acted as a mediated variable and presented the strongest effect on asthma control. The self-management behaviors pathway embraced almost exogenous variables, except health literacy and depression. The exogenous variables in this pathway affected directly and indirectly both positively and negatively to asthma control through self-management behaviors. The long-term care of asthma involves self-management behaviors that specifically act to control symptoms and reduce future risk, especially adherence to medication, avoiding environmental triggers of lung inflammation, and

monitoring symptoms to detect early warning signs of an asthma attack, thus making it easier to control symptoms.[2,10,18] The results of our study showed that self-management behaviors were positively affected by the self-efficacy pathway, but negatively affected by job stress. Adults with asthma who were aware of the severity of the symptoms and effects might try to adopt and maintain self-management behaviors to reduce suffering.[5,39]

Furthermore, job stress, a psychological effect, influenced asthma control both directly and indirectly though self-management behaviors. Job stress usually occurs if the job's characteristics of lower flexibility or low job decision latitude hinders managing acute asthma symptoms properly and in a timely manner.[18] Extreme work anxiety and overcommitment can lead to a decreased awareness of asthma-related physiological changes and inadequate avoidance of triggers in the workplace.[12,38] If job stress was absent or lowered, it would enhance self-management of adults with asthma. Hence, job stress in adults with asthma should be a concern for controlling asthma and future interventions because it revealed a strong negatively direct and indirect effects on asthma control and asthma self-management behaviors.

Although a literature review indicated that health literacy and depression affect both self-management behaviors and asthma control, unfortunately, health literacy and depression were not presented in the final model. Health literacy was found only as a direct effect on self-efficacy, while depression was found to have only direct effect on asthma self-management behaviors. It was also found that health literacy was rated at a moderate high level; however, a question might arise regarding the measurement with the instrument used in this study as the original instrument was developed for people with generally chronic illness. The scores indicated there was no depression in the sample but it was found small direct effect to asthma self-management. If it happened, it might increase the burden of coping and making asthma self-management more difficult.

Results from this study are consistent with several previous studies on well-controlled asthma.[10] Several studies in adults with asthma indicated that health literacy, illness perception, and social support were associated with increased self-efficacy,[21,22,28] and self-management behaviors.[22] Some previous research found low illness perception, high depression, and less social support were associated with poor adherence to asthma self-management.[18,39,40] Additionally, previous research found that adverse psychosocial work environments were associated with low asthma self-management and poor asthma control.[18]

Additionally, the research results partially confirmed the IFSMT that individual and family are keys of self-management for getting better outcomes. In this study, the context dimension (illnesses perception and social support) influenced self-efficacy in the process dimension to engage in self-management behaviors as the proximal outcome dimension. The context dimension (illness perception and social support) also directly impacted asthma self-management activities. A distal outcome in this study, asthma control, was affected by the proximal outcome of self-management behaviors and the context dimension of job stress. Although the results of this study mostly addressed self-management behaviors of patients without families' actions, the significance of social support seemed to present family involvement in individual self-management behaviors. However, in Thai culture, family involvement usually includes life contexts related to illness management such as adherence to regimens, positive cognitive functions, and lifestyle modifications.

Limitations

There were several limitations in this study. Based on the IFSMT, family actions for asthma control were not included in the study. Furthermore, generalizations must be viewed cautiously because the sample was recruited only in tertiary hospitals in the eastern region of Thailand. Moreover, the validity

of the Asthma Self-Care Practice Instrument was still questioned because it was initially developed for adolescents, even though, minor changes in wording made the items appropriate for adults. Finally, data collection was performed during the COVID-19 pandemic, and participants might have been exposed to unforeseen problems that they normally would not have reported. Family activities and new appropriate instruments are needed for future research in Thai context.

Conclusions and Implications for Nursing Practice

The results confirmed that asthma control was directly and indirectly influenced by individual internal and external factors that concurrently exert effects on distal outcome. Prior to developing interventions, nurses need to better understand key influencing factors for new interventions to promote asthma control for adults such as self-management behaviors, job stress, and asthma self-efficacy. A newly developed intervention should also include illness perception, social support, health literacy, and depression. This intervention should be combined with innovative technology and needs further testing for its effectiveness among different samples.

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โมเดลเชิงสาเหตุของการควบคุมโรคหืดในผู้ใหญ่ที่เป็นโรคหืด

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บทคัดย่อ: การควบคุมโรคเป็นเป้าหมายของการจัดการโรคหืดเพื่อป้องกันการกำเริบและลดความรุนแรงของการเจ็บป่วย การออกแบบวิธีการควบคุมโรคจะต้องมีความเข้าใจเกี่ยวกับปัจจัยที่สำคัญและมีอิทธิพลต่อการควบคุมโรคหอบหืด การศึกษานี้มีวัตถุประสงค์เพื่อพัฒนาและทดสอบแบบจำลองเชิงสาเหตุของการควบคุมโรคหืดในผู้ใหญ่ที่เป็นโรคหืด กลุ่มตัวอย่าง ได้แก่ ผู้ที่เป็นโรคหืดวัยผู้ใหญ่จำนวน 330 รายที่เข้ารับการรักษาที่คลินิกโรคหอบหืดและโรคปอดอุดกั้นเรื้อรังในโรงพยาบาลตติยภูมิจำนวน 4 แห่งในภาคตะวันออกของประเทศไทย รวบรวมข้อมูลโดยใช้แบบสอบถามข้อมูลส่วนบุคคล แบบสอบถามการรับรู้การเจ็บป่วย แบบสอบถามอาการวิตกกังวลและอาการซึมเศร้าในโรงพยาบาล แบบสอบถามความเครียดจากงาน แบบสอบถามการรับรู้การสนับสนุนจากสังคมแบบหลายมิติ แบบสอบถามความรอบรู้ทางสุขภาพเกี่ยวกับการทำหน้าที่ การสื่อสารและการวิเคราะห์ แบบสอบถามความรู้ ทัศนคติ แบบสอบถามการรับรู้สมรรถนะในตนเองในผู้ที่เป็นโรคหืด แบบสอบถามพฤติกรรมการจัดการตนเองเกี่ยวกับโรคหืด และแบบสอบถามการควบคุมโรคหืด ทดสอบโมเดลการควบคุมโรคหืดโดยการวิเคราะห์แบบจำลองสมการโครงสร้าง

หลังจากปรับแบบจำลองเบื้องต้น แบบจำลองสุดท้ายสามารถทำนายการควบคุมโรคหืดได้ร้อยละ 54 ซึ่งพฤติกรรมการจัดการตนเองเกี่ยวกับโรคหืดมีผลโดยตรงต่อการควบคุมโรคหืดมากที่สุด ส่วนความรอบรู้ทางสุขภาพ การรับรู้การเจ็บป่วย และการสนับสนุนทางสังคมมีผลทางอ้อมต่อพฤติกรรมการจัดการตนเองเกี่ยวกับโรคหืดผ่านทางการรับรู้สมรรถนะในตนเองเกี่ยวกับโรคหอบหืดจากนั้นส่งผลทางอ้อมต่อการควบคุมโรคหืด การรับรู้การเจ็บป่วย ภาวะซึมเศร้าและการสนับสนุนทางสังคม ยังมีผลทางอ้อมต่อการควบคุมโรคหืดผ่านพฤติกรรมการจัดการตนเองเกี่ยวกับโรคหืด ในขณะที่ความเครียดจากงานมีผลทางตรงและทางอ้อมต่อการควบคุมโรคหืดผ่านทางพฤติกรรมการจัดการตนเองเกี่ยวกับโรคหืด ผลการวิจัยชี้ว่าพยาบาลสามารถออกแบบรูปแบบการพยาบาลเพื่อสนับสนุนพฤติกรรมการจัดการตนเองเกี่ยวกับโรคหืดโดยส่งเสริมการรับรู้สมรรถนะในตนเองเกี่ยวกับโรคหอบหืดผ่านทางการเพิ่มความรอบรู้ด้านสุขภาพ การส่งเสริมการรับรู้การเจ็บป่วยและการสนับสนุนทางสังคม ตลอดจนลดความเครียดจากงานและภาวะซึมเศร้า ซึ่งรูปแบบการพยาบาลนี้ควรร่วมกับเทคโนโลยีนวัตกรรมและนำไปทดสองประสิทธิภาพต่อไป

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คำสำคัญ: ผู้ใหญ่ การควบคุมโรคหืด แบบจำลองเชิงสาเหตุ พฤติกรรมการจัดการตนเอง ไทย

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