FACTORS RELATED TO SELF-MANAGEMENT BEHAVIORS AMONG
PERSONS WITH MILD TO MODERATE CHRONIC OBSTRUCTIVE
PULMONARY DISEASES IN WENZHOU, CHINA

XIAOWEN SHENG

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF

THE REQUIREMENTS FOR MASTER DEGREE OF NURSING SCIENCE

(INTERNATIONAL PROGRAM)

IN ADULT NURSING PATHWAY

FACULTY OF NURSING

BURAPHA UNIVERSITY

2022

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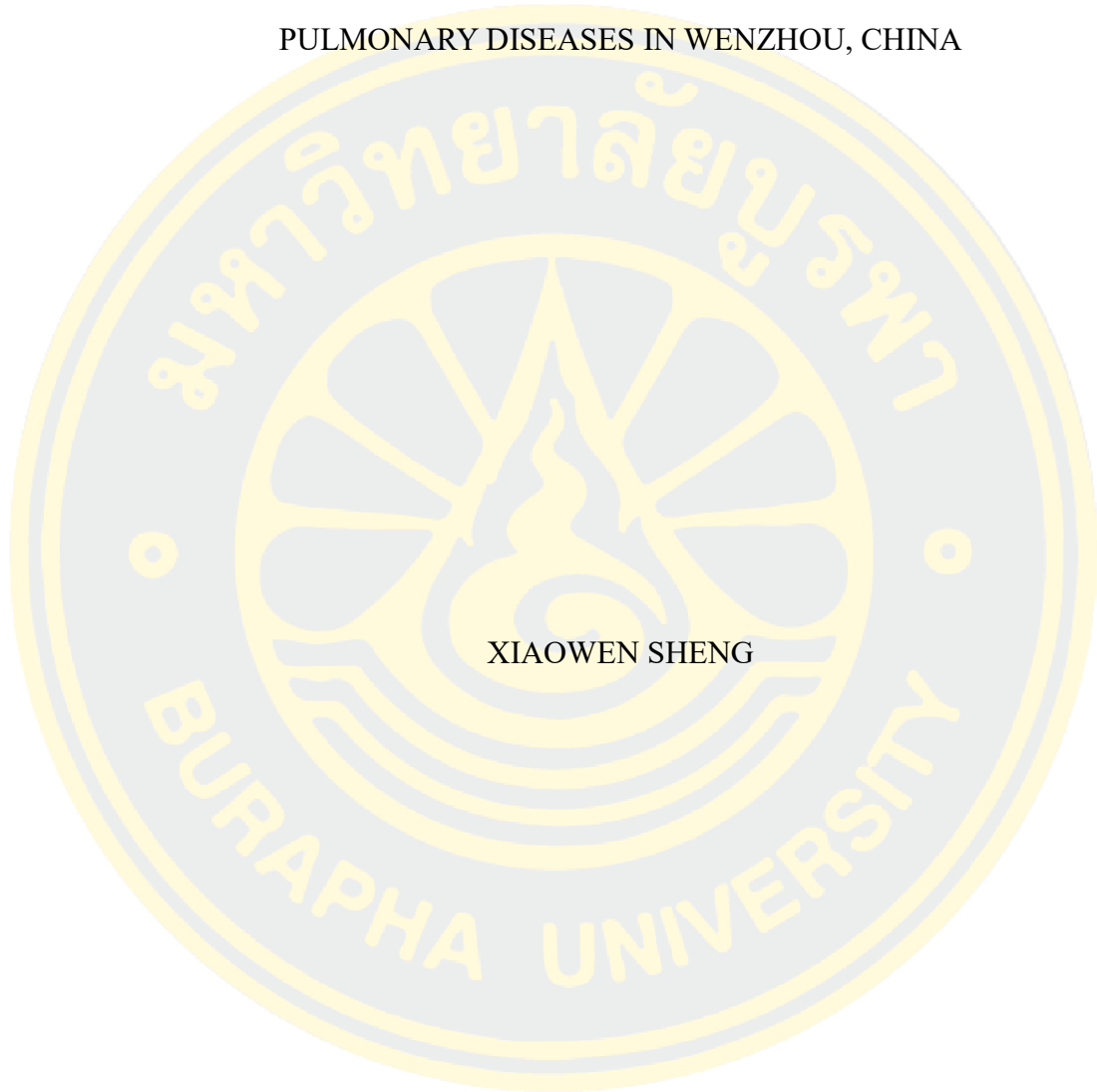
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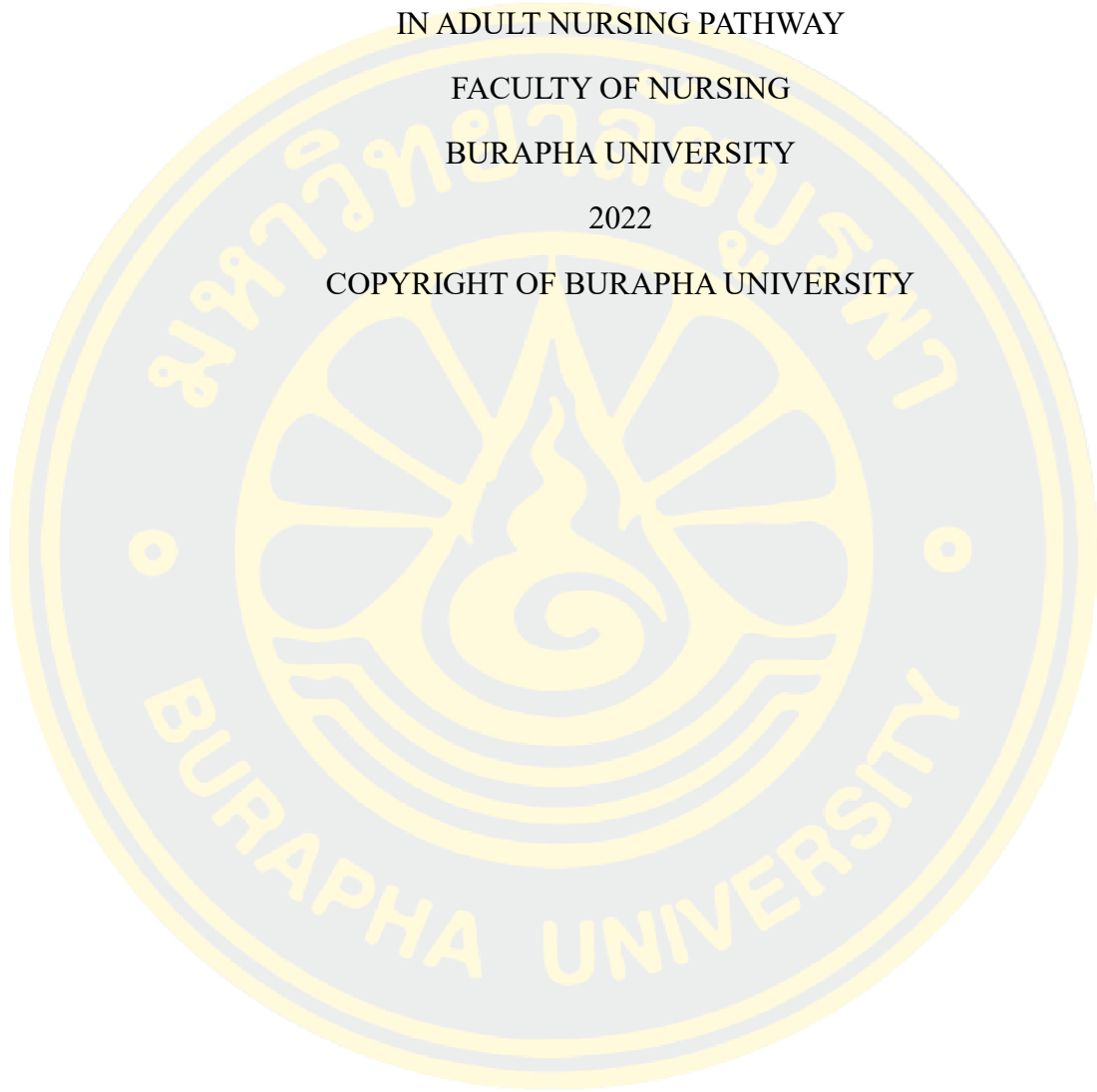
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The Thesis of Xiaowen Sheng has been approved by the examining committee to be partial fulfillment of the requirements for the Master Degree of Nursing Science (International Program) in Adult Nursing Pathway of Burapha University

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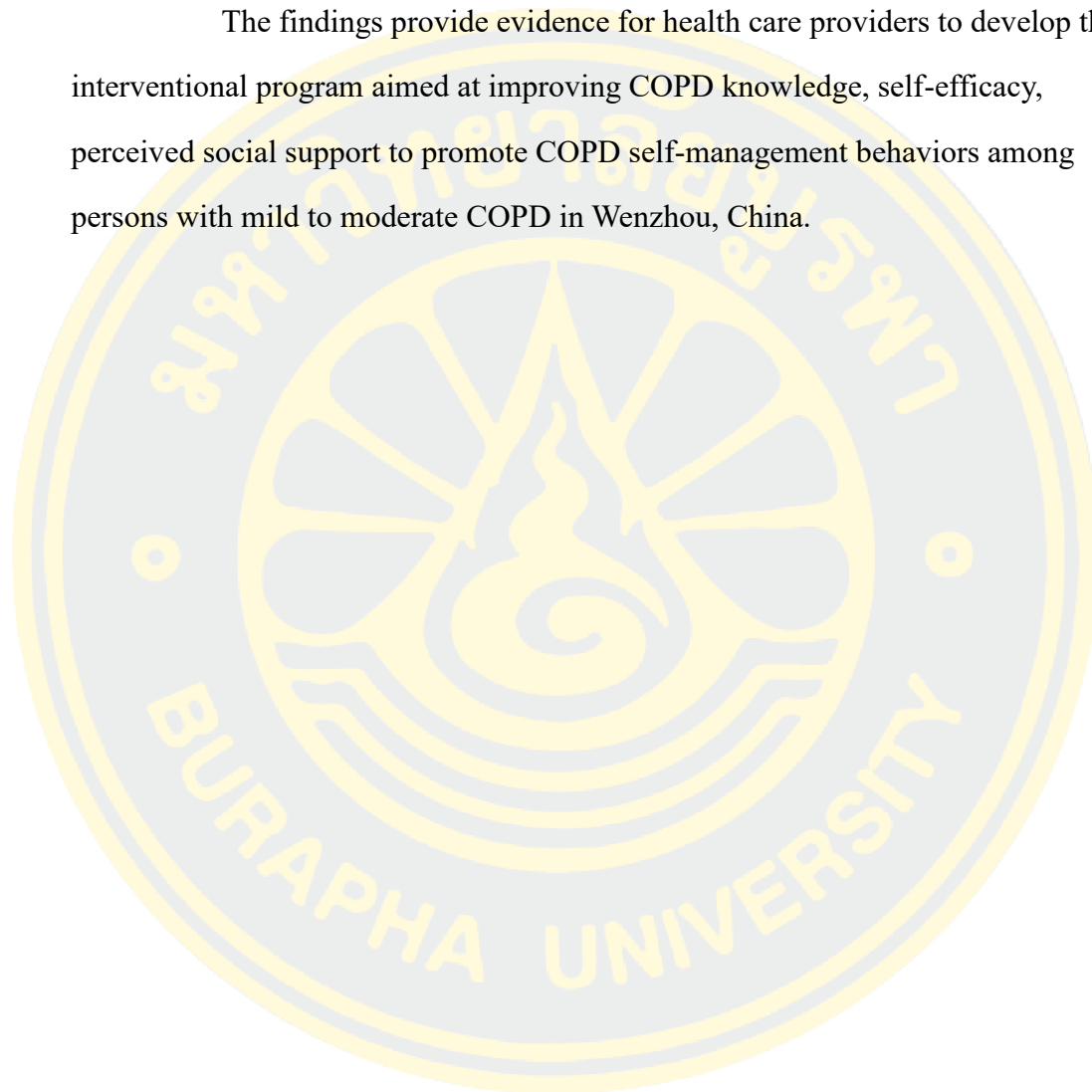
XIAOWEN SHENG : FACTORS RELATED TO SELF-MANAGEMENT BEHAVIORS AMONG PERSONS WITH MILD TO MODERATE CHRONIC OBSTRUCTIVE PULMONARY DISEASES IN WENZHOU, CHINA. ADVISORY COMMITTEE: NIPHAWAN SAMARTKIT, Ph.D., KHEMARADEE MASINGBOON, D.S.N 2022.

Self-management behaviors had been found to be important for chronic obstructive pulmonary disease (COPD). However, research on mild to moderate COPD is limited. The aim of this research was to describe the self-management behaviors, and examine the relationship between COPD knowledge, self-efficacy, perceived social support, and self-management behaviors among persons with mild to moderate COPD in Wenzhou, China. A simple random sampling technique was used to recruit 121 persons with mild to moderate COPD who visited the respiratory outpatient department in the First Affiliated Hospital of Wenzhou Medical University in Wenzhou, China. Research instruments included a demographic data questionnaire, the COPD self-management scale, the COPD questionnaire, the 6-item chronic disease self-efficacy scale, and the perceived social support scale, each bearing reliability of .89, .80, .88, and .89. Data were analyzed by descriptive statistics and Pearson's product-moment test.

The results of this study showed that the mean score of COPD self-management scale was 2.71 (SD = .44) out of 5. The Pearson correlation analysis revealed the COPD knowledge (r = .50, P < .001), self-efficacy (r = .29, P = .001),

perceived social support (r = .49, P < .001) had positive relationship with COPD self-management behaviors among persons with mild to moderate COPD in Wenzhou, China.

The findings provide evidence for health care providers to develop the interventional program aimed at improving COPD knowledge, self-efficacy, perceived social support to promote COPD self-management behaviors among persons with mild to moderate COPD in Wenzhou, China.

ACKNOWLEDGEMENTS

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CHAPTER 1
INTRODUCTION

Background and significance of the problem

Chronic obstructive pulmonary disease (COPD) is a progressive disease that requires lifelong management, and it is a global health problem because of its associated high prevalence and mortality (Global Initiative for Chronic Obstructive Lung Disease (GOLD), 2020). The global prevalence of COPD is 12.16% (Varmaghani et al., 2019). The China Pulmonary Health Study (CPHS) (2018) conducted a survey, showed that more than 100 million people suffer from COPD (Wang et al., 2018). The prevalence of COPD among people over 40 years old rose from 8.2% to 13.7% during the past decade (Wang et al., 2018). Additionally, the prevalence of COPD in people aged 20 to 39 in China was reported for the first time (2.1%) (Wang et al., 2018). The morbidity of COPD in China is increasing, the persons with COPD are getting younger. As most Wenzhou residents are engaged in plastic processing and leather shoe manufacturing, long-term exposure to dust and harmful gases results in a higher prevalence of COPD (Yang et al., 2016). A survey revealed that the prevalence of COPD among people over 40 years old is 14.53% in Wenzhou, China (Yang et al., 2016).

Persistent respiratory symptoms and airflow limitation are the characteristics of COPD (GOLD, 2020). The respiratory symptoms deteriorate the COPD individuals' lifestyle and quality of life (Fan et al., 2019; Vulpi et al., 2020; Welte et al., 2015). Respiratory symptoms impede patient's ability to perform everyday activities and impair their sleep quality (Orme et al., 2019). Besides, acute worsening of respiratory symptoms it may also cause COPD exacerbation (Criner et al., 2015), which is closely related to hospitalization and morbidity (Cardoso et al., 2018; Müllerova et al., 2015). It is estimated that the number of deaths due to COPD is 3

million per year worldwide (World Health Organization [WHO], 2017). In China, COPD mortality is 68.4/100000, becoming the third cause of death (Yin et al., 2019). COPD is the fourth leading cause of death in Wenzhou, China (Ma et al., 2015). In addition to experiencing physical burdens, COPD imposes a significant economic burden on families and society (Lee et al., 2019). The direct health care expenditure caused by COPD in the United States was about $30 billion a year (Guarascio et al., 2013). In China, a total cost of $151.6 billion to $266.3 billion per year is being spent to treat COPD (Fang et al., 2018). Therefore, COPD has become a severe health problem in China and Wenzhou.

According to the degree of airflow limitation (forced expiratory volume in 1 second, FEV_1), COPD is divided into mild, moderate, severe, and very severe (GOLD, 2020). Along with the development of the disease, people's daily activities get restricted, their quality of life is impaired, and symptoms get aggravated leading to exacerbation (Chinese Medical Association et al., 2018; GOLD, 2020). Hence it is important to manage and change patients' behavior at an early stage.

A study found that measurable physiological injuries, symptoms, and a higher risk for disease progression have occurred in mild to moderate COPD (Koo et al., 2018). Moreover, in China about 65% of mild to moderate COPD have at least one respiratory symptom such as dyspnea, wheezing, cough, and expectoration in China (Fang et al., 2018). 20% of mild to moderate persons developed respiratory symptoms at night (Miravitlles et al., 2018). In a 1-year prospective study, 70% of persons with mild to moderate COPD were reported to have exacerbation at least once in the UK (Hurst et al., 2010). Respiratory symptoms and exacerbation accelerate the worsening of the health status quickly and lead to the decline of FEV_1 in persons with mild to moderate COPD, which are faster than the severe and very severe COPD (Bhatt et al., 2016; Rodrigues et al., 2019; Tantucci & Modina, 2012). Also, Xiao et

al. (2018) found that persons with mild to moderate COPD experienced negative emotions of anxiety and depression.

Studies had shown that, with a distribution of disease severity dominated by mild to moderate COPD, 69.3% were mild to moderate COPD in the UK, 91.2% in Spain, and 94% in Japan (Barrecheguren & Bourbeau, 2018; Llordés et al., 2017). As well as, in China, 95.1% of COPD were mild to moderate COPD (Fang et al., 2018). Therefore, early treatment and management before developing into a more severe state are important in COPD.

COPD is considered to an incompletely reversible disease, so the goal of treatment is not to cure the disease but to change health behaviors and to equip persons with the skills to actively participate in disease management to prevent and alleviate symptoms, improve exercise endurance and health status, prevent exacerbation and slow down the disease process (Chinese Medical Association et al., 2018). Encountering the complexity of the disease and in response to difficulties induced by COPD. In China, persons with mild to moderate COPD usually co-manage the illness at home with family. Ryan and Sawin (2009) believe that living with a chronic condition is "complex and requires integration of self-management behaviors into the lifestyles of individuals and household". Self-management behaviors considered to be used not only to manage chronic symptoms but also to engage in health promotion (Ryan & Sawin, 2009).

COPD self-management behaviors refers to individuals' behaviors in daily life to relieve and control symptoms, reduce and prevent exacerbation, slow disease progression, and improve the quality of life (Yadav et al., 2020). For persons with mild to moderate COPD the persistence of good self-management behaviors are an essential part of effective treatment (Chinese Medical Association et al., 2018). Self-management behaviors of COPD persons mainly include symptom management (e.g., consistent use of drugs, inspiratory muscle training), daily life management (e.g.,

quitting smoking, ensuring annual influenza and streptococcus pneumoniae vaccination), emotion management, and information management (e.g., regular communication with health care providers) (Barrecheguren & Bourbeau, 2018; Jolly et al., 2016; Sidhu et al., 2015).

Many studies provide evidence that positive self-management behaviors play an important role in slowing down the disease process and improving the quality of life (Barrecheguren & Bourbeau, 2018; Jonsdottir et al., 2015; Li et al., 2014). Mild to moderate COPD persons who exercise regularly, and continued use of medicine can improve exercise ability, and reduce exacerbation (Jolly et al., 2016; Li et al., 2014; Sidhu et al., 2015). If mild to moderate COPD persons have regular communication with doctors it could reduce exacerbation by 45%-60% (Park et al., 2020) and reduce hospitalization and mortality (Einarsdóttir et al., 2010). Moreover, de Sousa Sena et al. (2017) believed that work productivity would flourish among persons with mild to moderate COPD through self-management behaviors. The COPD persons proper adherence to the appropriate self-management behaviors could also reduce the cost of treatment and the economic burden on individuals, families, and society (Lee et al., 2019). Parallelly, persons with mild and moderate COPD can improve health outcomes and keep their work and life unaffected through self-management behaviors.

However, self-management behaviors among persons with mild to moderate COPD were unsatisfactory. The study showed that only 2.1% of mild and moderate people visited outpatient regularly, and 24.3% still smoked in Korea (Lee et al., 2020). Persons with mild to moderate COPD had poor symptom management, and 46.3% had poor compliance with treatment (Aredano et al., 2020), and only 6% of COPD individuals were appropriate and regular use of inhalers (Sulaiman et al., 2017). A semi-structured interview in 14 moderate COPD persons found that many persons was unfamiliar with the type and amount of physical exercise that COPD can tolerate,

and they mistakenly choose to limit exercise to avoid dyspnea and wheezing (Molin et al., 2020). Likewise, in China, the study found that 51.8% of mild to moderate persons were smoking (Liu et al., 2020), only 37.1% of mild COPD persons exercised regularly (Yan et al., 2017), and 92.8% COPD persons were not vaccinated against influenza or streptococcus pneumoniae (Huang, 2017). Liu et al. (2018) found that 72.2% of persons with COPD have varying degrees of self-perceived burden, and their negative emotion has not been effectively managed. In China, 90% of COPD persons received information from health care providers (Liu et al., 2020). However, only 5% of COPD patients visited the outpatient department regularly, receiving less information about COPD (Liu et al., 2020). Thus, the self-management behaviors among the mild to moderate COPD persons needs to be paid attention and improved urgently.

Self-management behaviors of COPD persons were very complex, there were many factors related to self-management behaviors, including age, disease severity, education level, financial status, family income, health literacy (Chen et al.,2017; Hartman et al., 2013; Wang et al., 2014; Yang et al., 2019). However, it is worth noting that enhancing self-management process can promote the participation of self-management behaviors (Ryan & Sawin, 2009). These studies revealed that improvement of knowledge could enhance the understanding of self-management behaviors and increase self-efficacy (Yang et al., 2019; Cannon et al., 2016). Moreover, persons with higher self-efficacy and social support will make them more actively participate in self-management behaviors (Luo et al., 2015; Qi et al., 2013).

However, in China studies about the relationship between these variables focused on COPD people with all severity stages of COPD. Also, there are no studies on the self-management behaviors and the relationship between these three factors in mild to moderate COPD in China, including Wenzhou. Therefore, in these study, COPD knowledge, self-efficacy, and perceived social support will be selected to

examine whether these three factors related to self-management behaviors among persons with mild to moderate COPD in Wenzhou, China.

COPD knowledge refers to the patient's understanding of COPD's symptoms, medication, and risk factors (Maples et al., 2010). The study of persons with mild to severe COPD in China by Yang et al. (2019) found that COPD knowledge was related to self-management behaviors (r = .369, $p < .01$). The study found that COPD knowledge was related to symptom identification and management, respectively, in persons with all severity stages of COPD ($r = .403, p = .001$) (Wang et al., 2014). Also, COPD knowledge is related to exercise ($r = .160, p < .01$) and medical treatment behaviors in persons with all severity stages of COPD ($r = .524, p < .01$) (Jia et al., 2014). Molin et al. (2020) conducted a semi-structured interview with 14 moderate COPD persons and found that due to their lack of knowledge about COPD, the person had no understanding regarding the amount of physical activity that COPD could tolerate and avoided activity to prevent dyspnea. Apparently, there may be a correlation between COPD knowledge and self-management behavior of mild to moderate COPD.

Self-efficacy refers to a person's confidence in his or her ability to successfully perform a behavior under normal and stressful circumstances (Ryan & Sawin, 2009). Kosteli et al. (2017) conducted a qualitative study of 26 COPD patients with mild to very severe in primary care in the UK, and the results showed that self-efficacy was a promoting factor for COPD patients to participate in physical activity. Kara Kaşikçi and Alberto (2007) found a weak correlation between self-efficacy and self-care behaviors in a cross-sectional survey of 200 COPD patients, 78% of whom were in mild to moderate COPD ($r = .186, p = .01$). A study in China showed a moderate positive correlation between self-efficacy and self-management behaviors of persons with mild to severe COPD ($r = .667, p < .001$), 69% of whom were mild to moderate COPD (Luo et al., 2015). These studies suggest that self-efficacy may have

a positive relationship with self-management behaviors in mild to moderate COPD persons.

Perceived social support means that individuals get instrumental, emotional, and informative help to promote health from family, friends, and others (Zimet et al., 1990). Zhang et al. (2013) found that social support in patients with all severity stages of COPD was associated with self-management behaviors ($r = .665$, $p < .05$). In a study of 282 moderate to very severe COPD persons participant in the United States, Chen et al. (2017) found that individuals with COPD have high levels of social support, they have higher rates of physical exercise adherence compared to individuals with little social support ($p < .05$). The research reported that having good support from family could help COPD persons complete quitting smoking (Sigurgeirsdottir et al., 2019). Recent studies have shown that moderate COPD makes quitting smoking worse due to a lack of professional support from health care providers (Sandelowsky et al., 2019). A review of mild to moderate COPD (n = 577) in the UK found that intervention with social support can improve persons' physical activities and promote communication with health care providers (Jonsdottir et al., 2015). Accordingly, social support is a factor that may be able to relate to self-management behavior among persons with mild to moderate COPD.

Through literature review, COPD knowledge, self-efficacy, and social support have correlated with COPD persons' self-management behaviors. However, these studies focused on all the severity stages of COPD or severe stage COPD, limiting the generalizability of the findings to persons with mild to moderate COPD. Moreover, there was no specific study on the self-management behaviors and related factors of people with mild to moderate COPD in China, including Wenzhou. There is a lack of basic understanding of people's self-management behaviors with mild and moderate COPD and its related factors in Wenzhou, China. In Chinese culture, including Wenzhou, people with chronic diseases usually lives with their families,

takes care of each other, and manages the disease together. Guided by the IFSMT, the researcher conducts this study to explore the status of self-management behaviors of mild to moderate COPD persons and examine whether COPD knowledge, self-efficacy, and perceived social support are related to self-management behaviors among persons with mild to moderate COPD, in Wenzhou, China. This study will provide information for health care providers in Wenzhou to develop nursing intervention for the mild to moderate COPD persons, to support and guide them effectively to carry out disease management to improve their health outcomes and quality of life.

Objectives of the research

1. To describe the self-management behaviors among persons with mild and moderate COPD in Wenzhou, China.

2. To determine the relationship between COPD knowledge, self-efficacy, perceived social support and self-management behavior among persons with mild to moderate COPD in Wenzhou, China.

Research Hypotheses

1. COPD knowledge has positive relationship with self-management behaviors among persons with mild to moderate COPD in Wenzhou, China.

2. Self-efficacy has positive relationship with self-management behaviors among persons with mild to moderate COPD in Wenzhou, China.

3. Perceived social support has positive relationship with self-management behaviors among persons with mild to moderate COPD in Wenzhou, China.

Scope of study

The purpose of this study was to explore the status of self-management behaviors among mild to moderate COPD and determine the correlations between independent variables including COPD knowledge, self-efficacy, perceived social support and self-management behaviors in persons with mild to moderate COPD. The data collected in the respiratory outpatient department of the first affiliated Hospital of Wenzhou Medical University in Wenzhou, China in August to September 2021.

Research framework

This study based on a revised version of Individual and family self-management theory (IFSMT) by Ryan and Sawin (2009). The theory defines self-management behavior as the outcome of actual participation in self-management process and affected by context (risk and protective factors).

The IFSMT consists of three parts: context, process, and outcome. Context includes specific conditional factors, physical and social environment, as well as personal and family factors, which affect the process dimension or directly affect the outcome dimension. The process dimension of this theory refers to the self-management process of patients. The process dimension is composed of knowledge and belief (i.e., self-efficacy), self-regulation skills and ability, and social facilitation (i.e., social support), which can promote patients' participation in self-management behavior. The third dimension of the theory is the result dimension, which is divided into proximal outcome and distal outcome. The self-management behavior of patients' participation is the proximal outcome, while maintaining good health and higher quality of life is the distal outcome. The context, risk and protective factors affect each other. factors in the context dimension affect an individual's and family's ability to engage in the process dimension. Constructs in the process dimension are internally related and affect the outcome dimension (Ryan & Sawin, 2009).

Knowledge, self-efficacy, and social support belong to the process in the IFSMT. Ryan and Sawin (2009) propose that the improvement of knowledge can increase the understanding of self-management behavior and increase self-efficacy. Self-efficacy and social support can promote individuals and families to participate in self-management behavior. The IFSMT shows that the above three factors may have an association with self-management behavior. Previous studies have shown a correlation between that COPD knowledge, self-efficacy, social support, and COPD self-management behavior (Chen et al., 2017; Hartman et al., 2013; Yang et al., 2019). Therefore, guiding by the IFSMT, in this study, COPD knowledge, self-efficacy, and social support are presented as the independent variables and may be related to the self-management behaviors. Figure 1 depicts the relationship between all variables in this study.

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┌─────────────────────────┐
│     COPD Knowledge      │────────────┐
└─────────────────────────┘             ┌──────────────────────────────┐
                                        │  Self-management behaviors   │
┌─────────────────────────┐             │        among persons         │
│      Self-efficacy      │─────────────│  with mild to moderate COPD  │
└─────────────────────────┘             └──────────────────────────────┘
                                        ┘
┌─────────────────────────┐            ┘
│ Perceived social support│───────────┘
└─────────────────────────┘
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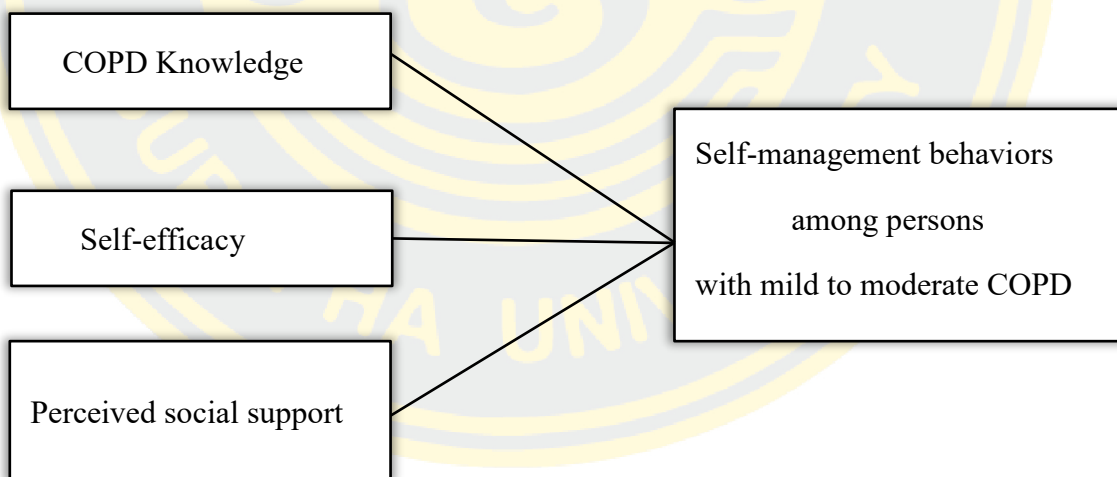
Figure 1 Conceptual framework

Operation definition

Persons with mild to moderate COPD refers to persons who have been diagnosed with mild to moderate COPD for at least 6 months according to the criteria of spirometry (FEV_1 and come to the respiratory outpatient department at the First

Affiliated Hospital of Wenzhou Medical University in Wenzhou, China for regular follow up.

Self-management behaviors refer to behaviors of COPD patients to prevent and reduce symptoms and prevent exacerbation including symptom management, daily life management, emotion management and information management. The COPD self-management scale (CSMS) was used to measure COPD self-management behavior, which was designed by Zhang et al. (2013) and modified by Yang et al. (2019).

COPD knowledge refers to the understanding of COPD and its management in people with mild to moderate COPD, including the clinical manifestations of COPD, disease risk factors, and COPD treatment and prevention. The Chinese version of Chronic Obstructive Pulmonary Disease Knowledge Questionnaire (COPD-Q) was used to measure COPD knowledge, which was developed by Maples et al. (2010).

Self-efficacy refers to the degree of confidence of people with mild to moderate COPD to complete self-management behavior. It was measured by the Chinese version of 6-item Chronic disease self-efficacy translated by Fu et al. (2003).

Perceived social support is the level at which people with mild to moderate COPD perceive support from family, friends, and others. It was measured by the Chinese version of perceived social support scale (PSSS) translated by Jiang (2001).

CHAPTER 2
LITERATURE REVIEWS

This chapter summarizes chronic obstructive pulmonary disease (COPD), the self-management behaviors of mild to moderate COPD persons, and the factors related to the self-management behaviors of mild to moderate COPD persons are as follows.

1. Chronic obstructive pulmonary disease (COPD)

   1.1 Definition of COPD

   1.2 Diagnosis and initial assessment of COPD

   1.3 Prevention and treatment of COPD

2. Self-management behaviors of COPD persons

   2.1 Definition of self-management behaviors

   2.2 Self-management behaviors among persons with mild to moderate COPD

   2.3 Self-management behaviors among persons with mild to moderate COPD in China

   2.4 Individual and family self-management theory (IFSMT)

3. Factors related to self-management behaviors among persons with mild to moderate COPD

   3.1 COPD knowledge

   3.2 Self-efficacy

   3.3 Social support

4. Summary of the literature review

Chronic Obstructive Pulmonary Disease (COPD)

COPD is a severe health problem worldwide. Nearly 400 million people worldwide are affected, and the global prevalence is 12.16% (Varmaghani et al., 2019). In China, the prevalence of COPD has increased rapidly. From 2002 to 2004, the prevalence of COPD among people over 40 years old in China was 8.2%. By 2012-2014, this number had risen to 13.7%, with about 100 million COPD persons (Wang et al., 2018). Additionally, the prevalence of COPD in people aged 20 to 39 in China was reported for the first time (2.1%) (Wang et al., 2018). The morbidity of COPD in China is increasing, the persons with COPD are getting younger. Fang et al. (2018) found that 95.1% of COPD persons had mild to moderate disease in China. As most Wenzhou residents are engaged in plastic processing and leather shoe manufacturing, long-term exposure to dust and harmful gases results in a higher prevalence of COPD (Yang et al., 2016). A survey found that the prevalence rate of COPD among people over 40 years old is 14.53% in Wenzhou, which is higher than the prevalence rate in China (Yang et al., 2016). Therefore, COPD has become a severe health problem in China and Wenzhou.

Definition of COPD

COPD is a common, preventable, and treatable disease. COPD is a chronic disease characterized by persistent airflow limitation, which is not entirely reversible (Chinese Medical Association et al., 2018). It is progressive and related to the lungs' abnormal inflammatory response to harmful gases or particles (Chronic Obstructive Pulmonary Disease Group Respiratory of Chinese Medical Association, 2013). It is characterized by persistent respiratory symptoms and airflow limitations, usually due to airway and/or alveolar abnormalities caused by massive exposure to toxic particles or gases affected by host factors, including pulmonary dysplasia. Severe complications may affect morbidity and mortality. Chronic airflow limitation is a

characteristic of chronic obstructive pulmonary disease caused by a mixture of small airway disease and parenchymal destruction (emphysema). Its relative contribution varies from person to person. These changes do not always occur at the same time but evolve at different speeds over time. Chronic inflammation leads to structural changes, small airway stenosis and pulmonary parenchyma destruction, resulting in loss of attachment between alveoli and small airways and reducing pulmonary elastic recoil (GOLD, 2020). In turn, these changes reduce the ability of the airway to remain open during exhalation. The loss of small airways may also lead to airflow limitation, and mucociliary dysfunction is characteristic of the disease (GOLD, 2020). The airflow limitation is usually measured by spirometer because it is the most widely used and reproducible lung function test (GOLD, 2020).

The purpose of the COPD assessment is to determine the level of airflow limitation, the impact of the disease on the patient's health status, and the risk of future events (such as deterioration, hospitalization or death) to guide treatment and management (GOLD, 2020).

Diagnosis and initial assessment of COPD

1. Diagnosis

The diagnosis of COPD should be based on clinical manifestations, exposure history of risk factors, physical signs, and laboratory examination. The diagnosis of typical COPD: dyspnea, chronic cough or chronic sputum production, recurrent lower respiratory tract infections, the history of exposure to risk factors, and family history of COPD and /or childhood factors; Spirometry should be used to measure the volume of air forcibly exhaled from the point of maximal inspiration (forced vital capacity, FVC) and the volume of air exhaled during the first second of this maneuver (forced expiratory volume in one second, FEV_1), and the ratio of these two measurements (FEV_1/FVC) should be calculated. Spirometry measurements are evaluated by comparison with reference values based on age, height, sex, and race.

The spirometric criterion for airflow limitation is a post-bronchodilator fixed ratio of $FEV_1/FVC < 0.70$, excluding other diseases (Chinese Medical Association et al., 2018; GOLD, 2020).

2. Assessment

COPD assessment must consider the following aspects of the disease separately: the presence and severity of the spirometric abnormality, current nature and magnitude of the patient's symptoms, history of moderate and severe exacerbations and future risk, and presence of comorbidities (Chinese Medical Association et al., 2018; GOLD, 2020).

2.1 Classification of mild to moderate COPD

Spirometry is the most reproducible and objective measurement of airflow limitation. Spirometry should be performed after the administration of an adequate dose of at least one short-acting inhaled bronchodilator to minimize variability (Chinese Medical Association et al., 2018; GOLD, 2020).

Refers to expiratory volume in the first second after maximal inspiration to the total lung capacity (TLC), both as a volume measurement and as a measure of mean flow rate in one second and is the primary indicator of impaired lung function (Chinese Medical Association et al., 2018; GOLD, 2020). The FEV_1 compares airflow to the average airflow of other people of the same age, sex, and body type, the formulas: $FEV_1 = Race \times 1.08 \times [(0.0395 \times Height) - (0.025 \times Age) - 2.6]$. The normal range is (3.18 ± 0.12) L for men and (2.31 ± 0.05) L for women. $FEV_1 = FVC$ in normal individuals, $FEV_1 < FVC$ in the presence of airway obstruction, decreased FEV_1 and prolonged expiratory time in obstructive ventilation disorders (Chinese Medical Association et al., 2018; GOLD, 2020). A lower-than-normal FEV_1 reading suggests that may be experiencing a breathing obstruction. Having trouble breathing is a hallmark symptom of COPD. COPD causes less air to flow into and out of a

person's airways than normal, making breathing difficult (Chinese Medical Association et al., 2018; GOLD, 2020).

The GOLD divides COPD into four levels according to the degree of airflow limitation (based on post-bronchodilator FEV_1)：GOLD 1 or mild, $FEV_1 \geq 80\%$ predicted; GOLD 2 or moderate, $FEV_1 \geq 50\%$ and $< 80\%$ predicted; GOLD 3 or severe, $FEV_1 \geq 30\%$ and $< 50\%$ predicted; and GOLD 4 or very severe, $FEV_1 < 30\%$ predicted (GOLD, 2020).

2.2 Assessment of symptom

The main symptoms of OPD are respiratory symptoms, including dyspnea, cough, sputum production, wheezing and chest tightness. Dyspnea, a cardinal symptom of COPD, is a major cause of the disability and anxiety that is associated with the disease. Typical COPD patients describe their dyspnea as a sense of increased effort to breathe, chest heaviness, air hunger, or gasping (GOLD, 2020). Chronic cough is often the first symptom of COPD. The cough may be intermittent, but subsequently may be present every day, often throughout the day (GOLD, 2020). Persons with more severe condition may have systemic symptoms, such as weight loss, loss of appetite, Fatigue, peripheral muscle atrophy, dysfunction, depression and/ or anxiety, and long-term severe cough, leading to cough syncope hemoptysis when complicated with infection (GOLD, 2020).

The symptoms and signs of mild and moderate COPD are usually inconspicuous or mild (Bringsvor et al., 2018; Miravitlles et al., 2018). Another study showed that COPD with any degree of airflow restriction developed symptoms, with a probability of 84-88% mild to moderate (Miravitlles et al., 2014). 65% of mild to moderate COPD patients in China have at least one respiratory symptom (Fang et al., 2018).

There are three measures of symptoms that are most wildly used. The modified British medical research council (mMRC) questionnaire is used to assess the

level of dyspnea. COPD assessment test (CAT[TM]) and COPD control questionnaire (The CCQ©) are comprehensive assessment symptoms, and because of not complex to use in routine practice (Chinese Medical Association et al., 2018; GOLD, 2020).

2.3 Assessment of exacerbation risk

COPD exacerbation is defined as an acute worsening of respiratory symptoms that result in additional therapy. Exacerbation can lead to volumetric treatment and is associated with hospitalization and mortality (GOLD, 2020). There is also a significant relationship between spirometric severity and the risk of exacerbation and death. At the population level, approximately 20% of GOLD 2 (moderate airflow limitation) patients may experience frequent exacerbations requiring treatment with antibiotics and/or systemic corticosteroids (GOLD, 2020). Studies have shown that 2.6% of mild and 7.3% moderate patients have experienced exacerbation in China in the past year (Fang et al., 2018).

2.4 Assessment of concomitant chronic disease (comorbidities)

Patients with COPD often have critical concomitant chronic illnesses at the time of diagnosis, and COPD represents an essential component of multimorbidity development, particularly in the elderly, in response to common risk factors (e.g., aging, smoking, alcohol, diet and inactivity) (GOLD, 2020). Common comorbidities include cardiovascular disease, skeletal muscle dysfunction, metabolic syndrome, osteoporosis, depression, anxiety and lung cancer (GOLD, 2020). The existence of COPD may increase the risk for other diseases. Comorbidities can occur in patients with mild, moderate or severe airflow limitation, influence mortality and hospitalizations independently, and deserve specific treatment. Therefore, comorbidities should be looked for routinely and treated appropriately in any patient with COPD (GOLD, 2020).

2.5 Combined COPD assessment

Understanding the impact of COPD on an individual patient combines the symptomatic assessment with the patient's spirometric classification and/or risk of exacerbations (GOLD, 2020). The "ABCD" assessment tool of GOLD is a comprehensive assessment tool for COPD. In the "ABCD" assessment scheme, patients should undergo spirometry to determine the severity of airflow limitation (i.e., spirometric grade) (GOLD, 2020). They should also undergo an assessment of either dyspnea using mMRC or symptoms using CAT™. Finally, their history of moderate and severe exacerbations (including prior hospitalizations) should be recorded (GOLD, 2020).

The goals of COPD assessment are to determine the level of airflow limitation, its impact on the patients' health status and the risk of future events (such as exacerbation, hospital admission or death), in order to, eventually, guide therapy (GOLD, 2020).

Prevention and treatment of COPD

COPD is considered to an incompletely reversible disease, so the goal of treatment is not to cure the disease but to change health behavior and to equip persons with the skills to actively participate in disease management to prevent and alleviate symptoms, improve exercise endurance and health status, prevent exacerbation, and slow down the disease process. Management strategies of COPD include pharmacologic and non-pharmacologic interventions. A consensus report between CMA and GOLD guidelines recommends the following therapy (Chinese Medical Association et al., 2018; GOLD, 2020):

1. Pharmacological treatment

Pharmacological therapy can reduce COPD symptoms, reduce the frequency and severity of symptoms, risk of exacerbation, and improve health status and exercise tolerance. Recent data suggest a beneficial effect on mortality.

Pharmacological therapy of COPD including bronchodilators (beta2-agonists, antimuscarinic drugs), anti-inflammatory agents (inhaled corticosteroids (ICS), and other drugs with the potential to reduce exacerbations (GOLD, 2020).

Bronchodilators are medications that increase FEV_1 and/or change other spirometric variables. They act by altering airway smooth muscle tone, and the improvements in expiratory flow reflect the widening of the airways. Bronchodilators including Beta2-agonists, Antimuscarinic drugs and methylxanthines (GOLD, 2020).

Regular and as-needed use of beta2-agonists improves FEV_1 and symptoms. The adverse effects of beta2-adrenergic receptors can precipitate cardiac rhythm disturbances in susceptible patients. Regular and as-needed use of antimuscarinic drugs has prolonged the bronchodilator effect duration and improve symptoms. Patients with low symptom burden and mild to moderate airflow obstruction treated with tiotropium (long-acting muscarinic antagonists, LAMA) showed increased FEV_1. The main side effect of antimuscarinic drugs is dryness of the mouth (GOLD, 2020).

The commonly used are the anti-inflammatory agent in clinical practice is inhaled corticosteroids (ICS). However, ICS is generally not recommended to be used alone in regular treatment. ICS does not modify the long-term decline of FEV_1 nor mortality in patients with COPD. ICS use is associated with a higher prevalence of oral candidiasis, hoarse voice, skin bruising and pneumonia (GOLD, 2020).

Combining bronchodilators with different mechanisms and durations of action may increase bronchodilation with a lower risk of side effects. In patients with moderate to very severe COPD and exacerbations, an ICS combined with a long-acting beta2-adrenergic (LABA) is more effective than either component alone in improving lung function, health status and reducing exacerbations. The inhaled treatment of LABA plus LAMA plus ICS (triple therapy) can improve lung function, patient reported outcomes and prevent exacerbations. In addition, most of the drugs

are inhaled, so proper inhaler technique is highly relevant. Inhaler technique needs to be assessed regularly (Chinese Medical Association et al., 2018; GOLD, 2020).

Each pharmacological therapy regimen should be individualized and guided by the severity of symptoms, risk of exacerbations, side-effects, comorbidities, drug availability and cost, and the patients' response, preference and ability to use various drug delivery devices (Chinese Medical Association et al., 2018; GOLD, 2020).

2. Non-pharmacological treatment

2.1 Identify and reduce exposure to risk factors

Smoking cessation is a crucial intervention for all COPD patients who continue to smoke. Healthcare providers are pivotal in delivering smoking cessation messages and interventions to patients and should encourage patients to quit at every available opportunity. Moreover, COPD patients need to avoid indoor and outdoor air pollution and smoke from biomass fuel. Efficient ventilation, non-polluting cooking stoves and similar interventions are feasible and should be recommended (Chinese Medical Association et al., 2018; GOLD, 2020).

2.2 Vaccination

Influenza vaccination decreases the incidence of lower respiratory tract infections, reduce serious illness (such as lower respiratory tract infections requiring hospitalization) and death in COPD. Influenza vaccination is recommended for all patients with COPD. Pneumococcal vaccination decreases lower respiratory tract infections. Pneumococcal vaccinations, PCV13 and PPSV23, are recommended for all patients > 65 years of age. The PPSV23 is also recommended for younger COPD patients with significant comorbid conditions, including chronic heart or lung disease (Chinese Medical Association et al., 2018; GOLD, 2020).

2.3 Pulmonary rehabilitation

Pulmonary rehabilitation is defined as "a comprehensive intervention based on thorough patient assessment followed by patient-tailored therapies that include, but

are not limited to, exercise training, education, self-management intervention aiming at behavior change, designed to improve the physical and psychological condition of people with chronic respiratory disease and to promote the long-term adherence to health-enhancing behaviors." The benefits to COPD patients from pulmonary rehabilitation are considerable, and rehabilitation is the most effective therapeutic strategy to improve shortness of breath, health status and exercise tolerance. In all cases, the rehabilitation intervention (content, scope, frequency, and intensity) should be individualized to maximize personal functional gains (Chinese Medical Association et al., 2018; GOLD, 2020).

2.4 Education and self-management

Self-management education and coaching by healthcare professionals should be a significant component of the "Chronic Care Model" within the healthcare delivery system. Patient education can improve skills, ability to cope with illness, and health status. COPD education program include smoking cessation; basic information about COPD; general approach to therapy and specific aspects of medical treatment (respiratory medications and inhalation devices); strategies to help minimize dyspnea; advice about when to seek help; decision-making during exacerbations; and advance directives and end-of-life issues. The intensity and content of these educational messages will vary depending on the severity of the patient's disease (Chinese Medical Association et al., 2018; GOLD, 2020).

Self-management interventions aim to motivate, engage, and coach patients to positively adapt their health behavior(s) and develop skills to manage their COPD on a day-to-day basis better. Effective self-management interventions demonstrated a lower probability of respiratory-related hospital admissions and improvements in health-related quality of life. However, the individual's evaluation and risk assessment concerning exacerbations, patient's needs, preferences, and personal goals should

inform the personalized design of the self-management education plan (Chinese Medical Association et al., 2018; GOLD, 2020).

Self-management behavior is an essential aspect of self-management. The Chinese government advises COPD people to adopt positive self-management behavior to manage diseases, especially in mild to moderate stages (State Council of the People's Republic of China, 2019). The adoption of healthy behaviors in mild to moderate stages is of decisive significance in slowing the disease's progression to severe stages (Liu et al., 2020). Therefore, it is necessary to strengthen the self-management behavior of mild to moderate COPD people in daily treatment and disease management (State Council of the People's Republic of China, 2019).

Self-management behaviors of COPD persons

Definition of self-management behaviors

Self-management behavior refers to behavior that prevents the disease from developing, monitoring disease signs, improving health, and improving life quality (Wang et al.,2017). Ryan and Sawin (2009) believe that living with a chronic condition is "complex and requires integration of self-management behaviors into the lifestyles of individuals and household".

Self-management behavior is used to manage chronic diseases and cooperate with other behaviors to promote health (Ryan & Sawin, 2009). Long-term good self-management behavior plays a useful role in developing a healthy lifestyle and increasing adaptive behavior. It plays a useful role in relieving discomfort symptoms and improving human immune function (Korpershoek et al., 2017).

The definition of self-management behaviors of chronic diseases is very different in daily life and research. Therefore, the accurate definition of terms is the key to science and practice. In this study, self-management behaviors are defined as healthy behaviors implemented by an individual in dealing with the disease and

during daily life. People acquire the necessary behaviors to manage and deal with diseases in daily life, individuals can correctly monitor and timely deal with disease symptoms and take actions to reduce the impact of diseases on all aspects of the individual, to maintain and improve their health.

Self-management behaviors among persons with mild to moderate COPD

COPD self-management behaviors refers to individuals' behavior in daily life to relieve and control symptoms, reduce and prevent deterioration, slow disease progression, and improve the quality of life (Yadav et al., 2020). Healthy self-management behavior can reduce dyspnea, reduce exacerbation, reduce hospitalization, and improve health-related quality of life in persons with COPD (Barrecheguren & Bourbeau, 2018; Jolly et al., 2016). Self-management behaviors of COPD persons mainly include quitting smoking, ensuring annual influenza and streptococcus pneumoniae vaccination, consistent use of drugs, regular exercise, and regular communication with health care providers (Barrecheguren & Bourbeau, 2018; Jolly et al., 2018; Sidhu et al., 2015). In this study, COPD self-management behaviors include symptom management, daily life management, emotion management and information management.

1. Symptom management

COPD is a variety of clinical symptoms. In daily life, cognition and management symptoms of COPD persons play a prominent part in self-management behavior (GOLD, 2020). Symptoms management mean that COPD patients take positive behaviors such as breathing training, effective methods of cough and sputum to control and alleviate symptoms and avoid risk factors to prevent symptoms from appearing and aggravating in daily life (Korpershoek et al., 2017; Zhang et al., 2013). The study demonstrated that respiratory symptoms and exacerbation increased the decline of FEV_1 in persons with mild to moderate COPD was faster than that in

severe and very severe COPD (Bhatt et al., 2016; Tantucci & Modina, 2012). Cognitive and manage symptoms in persons with mild and moderate COPD significantly slow down the disease's progression (Li et al., 2014). However, some qualitative studies demonstrated that COPD persons do not understand symptom recognition, symptom control, and avoiding stimuli, which is more pronounced in mild to moderate persons (Gupta et al., 2019; Molin et al., 2020).

Consistent use of drugs is a crucial symptom self-management behavior for COPD patients (Korpershoek et al., 2017). Although the long-term decline of pulmonary function in patients with COPD could not be reversed by drug treatment, adhering to medication treatment can prevent and control symptoms, reduce the incidence of COPD exacerbation, improve health status, and exercise endurance COPD patients (GOLD, 2020). A recent study showed that treatment with bronchodilators could improve lung function decline in persons with mild to moderate COPD (Li et al., 2019). Therefore, adhere to medication and inspiratory muscle training is also very important for mild to moderate patients. Another study shows that patients with COPD can improve their health-related quality of life by relieving dyspnea and wheezing through respiratory training (Bjoernshave et al., 2010). Nevertheless, Sulaiman et al. (2017) found that only 6% of persons with mild to moderate COPD use the inhalant with the accurate methods. 46.3% of persons with mild to moderate COPD were not adhering to the healthcare provider's treatment (Aredano et al., 2020).

2. Daily life management

Daily life management means that COPD persons take an active approach to appropriate exercise and avoid factors that induce acute COPD exacerbations in diet and activities (Zhang et al., 2013). According to GOLD guidelines, COPD persons identify risks and avoid risk factors (tobacco smoke, indoor and outdoor air pollution,

and occupational exposure) exposure in the early stages of the disease, reducing the incidence of dyspnea and deterioration (GOLD, 2020).

Tobacco is the most cardinal risk factor for accelerating lung function decline (GOLD, 2020). A cohort study in South Korea found that the annual mean decline in FEV_1 in the entire cohort was significantly more rapid for current smokers with COPD than never smokers with COPD (40.1ml vs. 31.8 ml; $p <$.001) (Leem et al., 2019). A retrospective case-control study in Turkey found that among current COPD smokers, the reduction in FEV_1 was 40-90 ml within 12 months, including mild COPD was 70 ml and moderate COPD was 60ml, and severe and very severe COPD was 40ml, indicating that tobacco has a greater effect on lung function decline in mild and moderate stages than in severe and very severe stages (Gülşen, 2020; Liu et al., 2020).

Studies have shown that quitting smoking is considered the most critical intervention that affects the natural course of COPD. The study showed that persons with mild to moderate COPD improved FEV_1 within one year after quitting smoking and had a subsequent rate of decline in FEV_1 that was half the rate of decline among continuing smokers (Scanlon et al., 2000). Moreover, the researchers also found that FEV_1 increased by an average of 80-100 ml in persons with COPD who was quitting smoking, and mild COPD was 110 ml, and moderate was 90 ml, and 7.3% of persons showed an improvement in COPD staging (Scanlon et al., 2000). Quitting smoking is of positive significance to slow down the development of COPD from mild disease to severe disease (Gülşen, 2020). Although quitting smoking is of positive significance to slow down COPD from mild disease to severe disease. Whereas Mun et al. (2015) show that only 45% of COPD people quit smoking, most persons who stop smoking are severe to very severe COPD in Korea. A retrospective case-control study in Sweden found that only 7.3% of persons with mild to moderate COPD quit smoking (Gülşen, 2020).

Regular physical exercise is considered essential health benefits and is a vital part of patients' active self-management behaviors with chronic diseases (Bernard et al., 2018). Physical inactivity in COPD is a fundamental cause of dyspnea, hospitalization, and mortality (Orme et al., 2019). Physical exercise has been demonstrated to ameliorate exercise tolerance and quality of life in persons with COPD and reduce hospitalization and mortality (Bernard et al., 2018; Korpershoek et al., 2017). Jácome and Marques (2014) found that more than 50% of persons with mild to moderate COPD had ameliorated dyspnea and exercise endurance by providing exercise planning. Besides, Korkmaz Ekren et al. (2018) showed that depression and anxiety scores decreased in mild to moderate patients through regular exercise ($p < .05$). Even in mild to moderate COPD, persons start to restrict exercise and activities, even sedentary to avoid dyspnea and wheezing, and emphasis should be given to exercise training (Fazleen & Wilkinson, 2020; Jácome & Marques, 2014).

In the early stages of COPD, dyspnea or wheezing usually occurs during physical activity and exercise (de Lima et al., 2019). Persons with mild to moderate COPD restrict their physical activities and exercises to avoid dyspnea or wheezing, while reduced physical activity and exercise in COPD can accelerate disease progression (Miravitlles et al., 2014). A semi-structured interview with 14 moderate COPD persons found that many persons were unfamiliar with the type and amount of physical exercise that COPD can tolerate, and they mistakenly chose to limit exercise to avoid dyspnea and wheezing (Molin et al., 2020). According to these evidences, the daily life management status of the COPD population is not ideal.

3. Emotional management

Psychological factors are believed to play a role in the self-management of COPD patients and affect the extent to which individuals improve their skills and knowledge (Sheridan et al., 2011). Anxiety, fear, depression, regret, and social isolation are the emotional factors that lead to the emotional burden of COPD. Many

COPD people accept their illness with a sense of helplessness (Sheridan et al., 2011). The overwhelming sense of helplessness may weaken the patient's motivation to participate in the complex treatment of COPD (Sheridan et al., 2011). In addition, due to long-term disease management and repeated disease changes, patients with COPD also have a higher self-perceived burden (Liu et al., 2018). Studies have shown that a heavy self-perceived burden is related to poor quality of life and is a fundamental cause of suicide in patients (Liu et al., 2018). A recent systematic review showed that the likelihood of suicide in patients is 1.9 times that of non-COPD patients (Sampaio et al., 2019). COPD anxiety and depression are important comorbidities of COPD, and both are associated with poor prognosis (Pumar et al., 2014). Many COPD patients experience anxiety or depression, with an average prevalence of 27.1% (Matte et al., 2016). In addition, depression can increase COPD symptoms, revealing a double and positive relationship between CPOD and depression (DeJean et al., 2013). It is worth noting that a study showed that the prevalence of depression (13.4%) and anxiety (8.1%) in people with mild COPD are higher than that in the healthy population (Xiao et al., 2018).

Emotional management of people with COPD is vital. Emotional management refers to COPD persons' self-awareness and self-control of their emotions (Zhang et al., 2013). The GOLD guidelines suggest that doctors and nurses need to inquire about depression and/or anxiety symptoms and instruct patients to deal with emotions correctly when taking a medical history, actively adopt methods such as talking with others, diverting attention, and seeking help from professionals to deal with the anxiety, distress, and depression caused by COPD (GOLD, 2020).

4. Information management

Information management means that COPD persons actively acquire knowledge related to COPD treatment, rehabilitation, examination, health care, and drugs through books, newspapers, televisions, and communication with medical staff,

and organize and save relevant data (Zhang et al., 2013). Besides, communication with health care providers is an integral part of the self-management behavior of COPD persons. COPD is a chronic disease that persons need to cooperate with health care providers and work together to manage the disease for life. Health care providers provide COPD with counseling and examination opportunities, improving inhaler skills, and adjusting treatment to prevent deterioration. Studies have shown that regular communication with doctors can reduce exacerbation by 45%-60% (Park et al., 2020), and reduce hospitalization and mortality (Einarsdóttir et al., 2010). According to qualitative research, COPD patients believe that maintaining regular communication with health providers can increase their confidence in coping with the disease and reduce their anxiety (Sandelowsky et al., 2019).

However, due to mild symptoms and relatively good lung function, the persons with mild to moderate COPD people tend not to go to the hospital or other health department unless there are apparent symptoms or exacerbation (Barrecheguren & Bourbeau, 2018), only 2.1% of persons with mild to moderate receive regular visits in Korea (Lee et al., 2019). This leads to a lack of communication with doctors and nurses, causing them to take unhealthy behaviors to cope with dyspnea such as sedentary (Molin et al., 2020).

Obviously, performing self-management behaviors among COPD persons still be problematic particularly in mild to moderate group (Barrecheguren et al., 2018; Fazleen & Wilkinson, 2020). Therefore, it is necessary to increase the comprehensive understanding of the self-management behaviors of people with mild to moderate COPD (Barrecheguren et al., 2018).

Self-management behaviors among persons with mild to moderate COPD in China

COPD control and prevention has become a great challenge for China (Fang et al., 2018; Wang et al., 2018). It was estimated that there were about 100 million

COPD persons in China (Wang et al., 2018). From 2002 to 2004, the prevalence of COPD among people aged over 40 years in China was 8.2% and by 2012-2014, this figure had risen to 13.7% (Wang et al., 2018). Among them, mild to moderate COPD accounted for 95.1% of all COPD persons (Fang et al., 2018). As most Wenzhou residents are engaged in plastic processing and leather shoe manufacturing, long-term exposure to dust and harmful gases results in a higher prevalence of COPD (Yang et al., 2016). A survey found that the prevalence rate of COPD among people over 40 years old is 14.53% in Wenzhou, which is higher than the prevalence rate in China (Yang et al., 2016).

Although there are a large number of COPD persons in Wenzhou, China, but there is a lack of treatment and management of COPD persons (Wang et al., 2018). In a study of 320 COPD patients, 69.4% of them belonged to mild to moderate COPD self-management behaviors survey found that the level of self-management behaviors was low, and the scores of cognitive symptoms and communication with doctors were only 0.9-1.0 and 0.7-0.8 (each total score is 5) in Shanghai, China (Yao et al., 2013). Liu et al. (2020) also found that mild to moderate patients did not participate in regular follow-up, and only 5% of persons went to the outpatient clinic. A cross-sectional survey of 4331 Chinese COPD patients by Liu et al. (2020) found that 51.8% of the mild to moderate COPD persons currently smoking. The study has also shown that persons with mild to moderate COPD were less likely to quit smoking compared with severe and very severe COPD (Liu et al., 2020). A cross-sectional survey of COPD patients in 115 urban and rural areas of 12 provinces in China found that 33.6% of mild COPD persons were exposed to secondhand smoke every day, 52.9% of mild COPD persons had sedentary behavior (more than 3 hours a day), only 31.7% of persons with mild COPD in regular exercise, and only 8.1% of COPD persons followed the behaviors of quitting smoking, regular exercise, and healthy diet at the same time (Yan et al., 2017).

The self-management behavior of persons with mild to moderate COPD is not taken seriously. China is a developing country, and the health care system for mild to moderate COPD is not perfect, and there is a lack of publicity, education, treatment, and care about COPD (Cong et al., 2020; Fang, Wang, & Bai, 2011). Simultaneously, the medical resources are mainly concentrated in severe and very severe COPD, while mild and moderate COPD are ignored, which also leads to people's failure to realize the benefits of healthy self-management behavior on the disease (Yan et al., 2017). Besides, culture and beliefs are also worth considering. "illness" is taboo among Chinese people, and people usually avoid the fact that they suffer from chronic diseases and do not carry out the behavior of managing diseases (Yan et al., 2017). This phenomenon is more obvious in persons with mild illness. Besides, the family and the individual are considered to inseparable in China, under the influence of this traditional culture, the family is very important to the individual in China (Zhang et al., 2011). When an individual is in the stage of illness, the role of the family will be particularly important in China. Family members will consciously assume the responsibility of taking care of patients and provide support to patients (Xiu et al., 2017). These may have a far-reaching impact on the self-management behavior of COPD people.

As a chronic disease, COPD is usually incurable, characterized by aggravation and remission of the disease, so it must be managed for life. This requires patients, families, and health providers to be jointly responsible for and manage daily treatment, symptoms management, and lifestyle changes related to chronic diseases. COPD affects all aspects of personal and family life, thus complicating disease management, so individuals and families are required to participate in disease management and re-establish an acceptable lifestyle (Miller et al., 2015).

The individual and the family are inseparable in China, including Wenzhou. In China and Wenzhou, the family mainly refers to the patient's partner, children, and

other relatives. Under the influence of this traditional culture, the families are significant to the individual in China. The family affects every stage of the individual. When an individual is in the illness stage, the family's role will be particularly influential in China. Family members will consciously assume the responsibility of taking good care of patients and provide support to patients, including providing information about the disease, taking care of their dietary needs, arranging to see a doctor, and providing translation and information support during clinical interactions, and support for drugs and lifestyle changes (exercise, quitting smoking and eating healthily).

Therefore, this study is based on the theoretical model of individual and family self-management. To explore the relationship between physiological and social environment (social support), knowledge and belief (disease knowledge and self-efficacy), and short-term outcome (personal and family self-management behavior) in patients with COPD.

Individual and family self-management theory（IFSMT)

Individual and family self-management theory (IFSMT) is a new mid-range descriptive theory by Ryan and Sawin (2009). The conceptual definition of IFSMT is the purposeful incorporation of health-related behaviors into an individual or family's daily functioning. Individuals or families assume responsibility for chronic diseases or healthy behaviors by purposefully carrying out a series of acquired behaviors. Living with chronic diseases or engaging in healthy behavior is complex, and it is necessary to integrate self-management behavior into individuals and families (Ryan & Sawin, 2009).

The IFSMT proposes that self-management is a complex dynamic phenomenon, and it consists of context, process, and outcome. Factors in the

contextual dimension influence individual and family engagement in the process of self-management as well as directly impact outcomes. Strengthening the process of self-management of individuals and families will produce more positive results. The result is proximal or distal. While the outcomes of concern are related to individual and families, improvement of individual and family outcomes translates to improved outcomes for healthcare practitioners and systems (Ryan & Sawin, 2009).

Context (Risk and protective factors)

Condition-specific is defined as a physiological, structural, or functional characteristic of the conditions, its treatment, or prevention of the conditions that impact the amount, type, and critical nature of behaviors needed to manage the conditions (i.e., complexity of conditions or treatment, trajectory, physiological stability, or physiological transitions). The physical and social environment is defined as physical or environmental factors that enhance or hinder the self-management of individuals and families, and include factors such as access to health care, transition in health care providers or setting, transportation, neighborhoods, school, work, culture, and social capital. Individual and family factors are those characteristics of individual and family directly, such as developmental stages, learning ability, literacy, family structure or functioning, and self-manage capacity.

Process (The self-management process)

The process dimension of IFSMT is based on the dynamic interaction among condition-specific knowledge and beliefs, acquisition and use of self-regulation skills and abilities, and social facilitation and negotiation. Knowledge and beliefs are defined as factual information and perceptions about a health condition or health behavior, including self-efficacy, outcome expectancy, factual information, and goal congruence. In this study, COPD knowledge and self-efficacy belong to the concepts of knowledge and belief.

Self-regulation is an iterative process people engage in to achieve a change in health behavior. Self-regulation includes several skills and abilities that include goal setting, self-monitoring and reflective thinking, decision-making, planning and cation, self-evaluation, and emotional control.

Social facilitation occurs within relationships and enhances an individual's capacity to change, includes social influence, support (emotional, instrumental, or informational), and negotiated collaboration. In this study, social support belong to the concepts of Social facilitation.

Proximal and distal outcome

This dimension includes proximal or short-term outcomes that lead to the attainment of the distal outcomes. Proximal outcomes include individual and family self-management behaviors (engagement in activities and treatment regimens, recommended pharmacological therapies, and symptom management), and cost of health care services. Distal outcomes include health status, quality of life, and cost of health.

Interactions among constructs, according to Ryan and Sawin (2009), explain that the context, risk, and protective affect each other. Together, factors in the context dimension affect an individual's and family's ability to engage in the process dimension and directly impact the outcome. Constructs in the process dimension are linked to constructs in the context dimension, are internally related, and affect the outcome dimension. Constructs of the outcome dimensions are affected by both context and process dimensions. Outcomes are proximal and distal, with the achievement of proximal outcomes causing, at least in part, distal outcomes.

Ryan and Sawin (2009) think that individual and family-centered interventions impact SM by addressing the SM process's context. Interventions aimed at the context can reduce risk or foster conditions that support SM. The intervention

aimed at the SM process can enhance knowledge and beliefs, increase an individual's use of self-regulation behaviors, and foster social facilitation.

In the IFSMT, many factors are related to self-management behavior, and these factors may directly or indirectly relate to self-management behavior. On this basis, some factors are selected as independent variables. The researchers summarized the relationship between these factors and COPD self-management behavior, including COPD knowledge, self-efficacy, and social support.

Knowledge, self-efficacy, and social support belong to the process in the IFSMT. Ryan and Sawin (2009) propose that the improvement of knowledge can increase the understanding of self-management behavior and increase self-efficacy. Self-efficacy and social support can promote individuals and families to participate in self-management behavior. The IFSMT shows that the above three factors may have an association with self-management behavior. Previous studies have shown a correlation between that COPD knowledge, self-efficacy, social support, and COPD self-management behavior (Chen et al., 2017; Hartman et al., 2013; Yang et al., 2019).

These studies conclude that if patients do not know about the disease, the effects of drugs and treatment, they will have no ideas to promote self-management behaviors (Cannon et al., 2016; Yang et al., 2019). The improvement of knowledge can increase the understanding of self-management behaviors and increase the self-efficacy (Ryan & Sawin, 2009); if patients have higher self-efficacy, they will be more involved in self-management behaviors (Luo et al., 2015); if patients feel a higher level of social support, they will have more opportunities to get help, which will make them more actively participate in self-management behaviors (Chen et al., 2017).

Therefore, guiding by the IFSMT, in this study, COPD knowledge, self-efficacy, and social support are presented as the independent variables and may be related to the self-management behaviors.

Factors related to self-management behaviors among persons with mild to moderate COPD

COPD knowledge

COPD knowledge refers to the persons' understanding of the symptoms, medication, and risk factors of COPD (Maples et al., 2010). Ryan and Sawin (2009) expressed the opinion that improvement of knowledge will increase the understanding of self-management behavior of persons. Persons with mild and moderate COPD must acquire knowledge at different stages of the disease to carry out self-management behavior to maintain the stability of the disease and control the symptoms (Wong & Yu, 2016; Lee et al., 2020). It is important for them to understand the pathology of the disease, the risk factors for disease progression, and the role they and their health care providers must play to achieve optimal management and health outcomes (Lee et al., 2020). Yang et al. (2019) study of persons with mild to severe COPD in China found that COPD knowledge was related to self-management behavior ($r = .369$, $p < .01$). The study found that COPD knowledge was related to symptom identification and management, respectively, in persons with all severity stages of COPD ($r = .403$, $p = .001$) (Wang et al., 2014). Also, COPD knowledge is related to exercise ($r = .160$, $p < .01$) and medical treatment behavior in persons with all severity stages of COPD ($r = .524$, $p < .01$) (Jia et al., 2014).

COPD persons with less COPD knowledge may have adverse consequences for patients, including a lack of awareness of the importance of COPD treatment and self-management, and the long-term effects (Cong et al., 2020; Wong & Yu, 2016). Lee et al. (2020) conducted a semi-structured interview with 14 moderate COPD and found that due to their lack of knowledge of COPD, they did not understand the physical exercise that COPD could tolerate to avoid activity to avoid dyspnea. Apparently, there may be a correlation between COPD knowledge and self-management behavior of mild to moderate COPD.

Self-efficacy

Self-efficacy refers to a person's confidence in his or her ability to successfully perform a behavior under normal and stressful circumstances (Ryan & Sawin, 2009). The higher the level of personal self-efficacy, the easier it is to take and maintain self-management behavior for a long time (Ryan & Sawin, 2009). The individual's confidence is critical to developing self-management behavior, especially as COPD self-management becomes progressively more burdensome and complex. COPD persons with high confidence in disease management are more persistent in functional exercise capacity, smoking cessation and adherence to medications (Fan et al., 2019; Qi et al., 2013). Kosteli et al. (2017) conducted a qualitative study of 26 COPD patients with mild to very severe in primary care in the UK, and the results showed that self-efficacy was a promoting factor for COPD patients to participate in physical activity. Kara Kaşikçi and Alberto (2007) found a weak correlation between self-efficacy and self-management behavior in a cross-sectional survey of 200 COPD patients, 78% of whom were in mild to moderate COPD ($r = .186$, $p = .01$). A study in China showed a moderate positive correlation between self-efficacy and self-management behavior of persons with mild to severe COPD, 69% of whom were mild to moderate COPD ($r = .667$, $p < .001$) (Luo et al., 2015). In a study of 320 mild to very severe COPD, Yao et al. (2013) concluded that there was positive correlation between self-efficacy and both each specific aspects of COPD self-management behavior (cognitive symptom management and practice, exercise, and communication with doctors: $r = .330, .55, .044$, $p < .001$) in Shanghai, China.

These studies suggest that self-efficacy may have a positive on mild to moderate COPD self-management behaviors.

Perceived Social support

Social support means that individuals get instrumental, emotional, and informative help to promote health from family, friends, and others (Zimet et al.,

1990). The emotional experience and satisfaction of individuals who are respected, supported and understood in society are closely related to their subjective feelings (Zimet et al., 1990). Persons with COPD need constant care all their lives, and their daily life need more social support (Liu et al., 2020). Ryan and Sawin (2009) believed that patients who experience positive influence and support in daily life are more likely to engage in recommended health behaviors. Social support is related to self-management behavior, which will have a positive or negative impact on self-management behavior (Lenferink et al., 2018). Gupta et al. (2019) conducted a semi-structured interview with 14 people with mild to very severe COPD found that persons did not know how to control the symptoms by some behaviors because of the lack of support from professionals. In a study of 282 moderate to very severe COPD persons participant in the United States, Chen et al. (2017) found that individuals with COPD have high levels of social support, they have higher rates of physical exercise adherence compared to individuals with little social support ($p < .05$). In China, the study found that social support in persons with all severity stages of COPD was associated with symptom management behavior, daily life management behavior, emotion control behavior and information management behavior ($r = .353, .331, .211 .297, p < .05$) (Zhang et al., 2013).

Perceived social support includes support from family and support from friends and others (Jiang, 2001). Family support includes providing information about the disease, arranging medical appointments, supporting medications and lifestyle changes. Previous studies have shown that COPD people with high family support levels have higher smoking cessation compliance, exercise, and emotional control levels than those with low family support levels (Chen et al., 2017; Kara Kaşikçi & Alberto, 2007).

In addition, the high level of continuous professional support by health providers can increase the awareness of COPD patients on diseases and risk factors

and improve health literacy and long-term health behaviors (Clari et al., 2017). Gupta et al. (2019) conducted a semi-structured interview with 14 people with mild to very severe COPD found that persons did not know how to control the symptoms by some behaviors because of the lack of support from professionals. Recent studies have shown that moderate COPD makes quitting smoking worse due to a lack of professional support (Sandelowsky et al., 2019). A review of mild to moderate COPD (n = 577) in the UK found that intervention with social support can improve persons' physical activity and promote communication with health care providers (Jonsdottir et al., 2015). Therefore, social support is a factor that may be able to relate to self-management behavior among persons with mild to moderate COPD.

Summary

COPD has become a health problem that is not ignored worldwide, including in China. COPD is an irreversible disease. Effective treatment and behaviors change are essential in the disease's early stage. With mild symptoms and relatively good lung function, persons with mild to moderate COPD should focus on healthy behaviors change. Persons with mild to moderate COPD adhere to self-management behaviors, preventing and slowing down symptoms, preventing deterioration risk, slowing down the disease process, and maintaining normal life and work. But the situation about self-management behaviors among mild to moderate COPD in Wenzhou is not an idea generally. According to the literature review, studies on the related factors of mild and moderate self-management behaviors are extraordinary in Wenzhou. Therefore, it is urgent to identify the factors associated with self-management behaviors of mild to moderate population.

Accordingly, guided by the IFSMT, the researcher conducts this study to explore the status of self-management behavior of mild to moderate COPD persons and examine whether COPD knowledge, self-efficacy, and social support are related to self-management behavior among mild to moderate COPD, in Wenzhou, China.
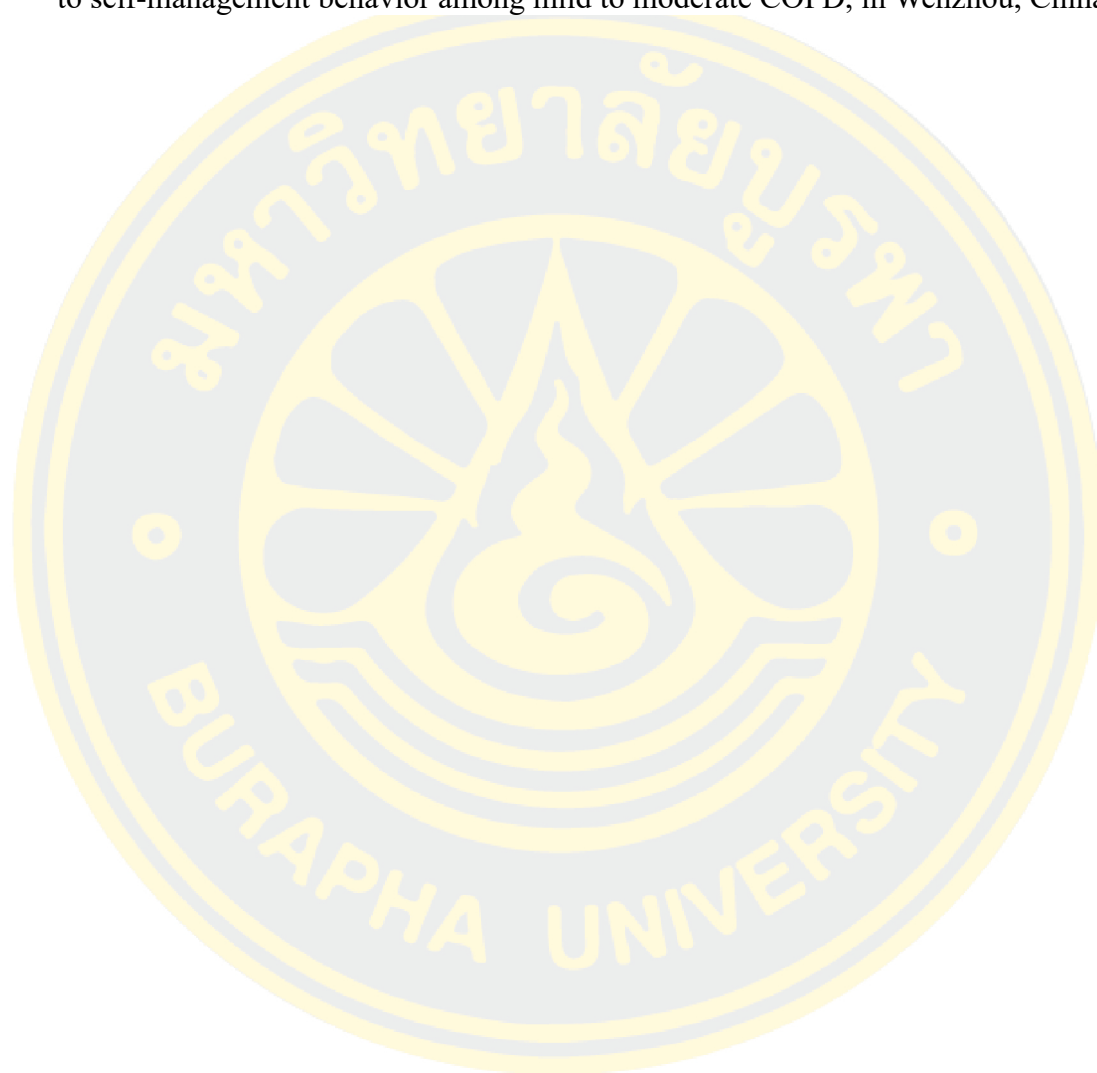
CHAPTER 3
RESEARCH METHODOLOGY

This chapter presented the research methodology including research design, population, and sample, setting of the study, instruments, ethical consideration, data collection procedures, and data analysis procedures.

Research design

The descriptive correlational research design was used to investigate the relationship between COPD knowledge, self-efficacy, perceived social support, and self- management behaviors among persons with mild to moderate COPD in Wenzhou, China.

Population and sample

Population

The target population of this study was persons with mild to moderate COPD ($FEV_1 \geq 50\%$) who were treated in the respiratory outpatient department of the First Affiliated Hospital of Wenzhou Medical University in Wenzhou, China. The information collected from this respiratory outpatient department showed that approximately 1200 to 1500 COPD persons, however, in this group, 600 to 750 persons belonged to mild to moderate COPD, visited the respiratory outpatient department every month.

Sample

The samples were persons with mild to moderate COPD who visited the respiratory OPD of the First Affiliated Hospital of Wenzhou Medical University in Wenzhou, China, to follow up on their health. A simple random sampling technique was used after recruitment. The sample followed the inclusion criteria include:

1. Age $\geq$ 20 years old

2. Diagnosed with COPD for at least 6 months

3. The spirometric result for airflow limitation is a post-bronchodilator fixed ratio of $FEV_1/FVC < 0.70$ and $FEV_1 \geq 50\%$

4. Have a certain ability to write and can speak Chinese

5. Have good orientation to place and time and has no history of mental illness

6. Have no major physical disability such as blindness or reduced physical mobility requiring assistant

Sample size

The sample sizes in this study were calculated by using the G*Power 3.1.9.7 program for correlational research design. From literature review, the study on the relationship between the self-management behavior and each independent variable. The effect size form correlation studies range from .15 to .31 (Liu, 2019; Yao et al., 2013; Xie & Xi, 2015; Yang et al., 2019), which are small or medium effect size. In this study, the effect size of .26 (Liu, 2019), alpha of .05 and power of .80 was used for computing the sample size. The required sample size was at least 111 participants.

Sampling technique

A Simple random sampling technique was used in this study. The sample was randomly selected without bias, and each sample had an equal chance of being chosen for the study. The researcher explained the purpose and process of this study to the respiratory outpatient department physicians and registered nurses and obtained their consent. The researcher accompanied the registered nurse in the respiratory outpatient department and selected the mild and moderate COPD persons who met the inclusion criteria from the appointment COPD persons. The researcher randomly selected 50% of these persons as a sample by preparing two sheets of paper of the same size and material and wrote down the "odd numbers" and "even numbers",

respectively. The papers were folded and mixed in a prepared bag. Everyday morning, the researcher randomly selected one paper from the bag. Suppose the researcher picked up an "even number" on that day. The researcher collected data from mild to moderate COPD persons with an even number of appointments. After obtaining the selected participants' consent, the researcher instructed them to sign the consent form and fill in the questionnaires. About 7 to 10 patients were recruited per day, depending upon the number of people visiting the respiratory outpatient department. The samples were recruited until the required sample size was reached, and then recruitment was stopped for the next phase of the study.

Study Setting

The study was conducted in the respiratory outpatient department in the First Affiliated Hospital of Wenzhou Medical University, in Wenzhou, China. There is one respiratory outpatient department with three rooms in the hospital, which opens five days a week (Monday to Friday) from 08:30 to 11:30 a.m. and from 01:30 to 04:30 p.m. The one respiratory outpatient department with three rooms serves about 30 to 40 mild to moderate COPD persons on working days.

The one respiratory outpatient department with three rooms are managed by 12 respiratory doctors and 6 registered nurses without other health care providers. When COPD persons come to respiratory outpatient department, they should re-visit according to the doctor's advice (usually 1-2 months per visit) or their condition (such as symptom control).

Their families usually accompanied COPD patients to the hospital. The doctors are mainly responsible for checking whether the current treatment plan is effective and whether the patient's medication is correct. The doctors will evaluate the patient's health, complete the health examination, and adjust the treatment plan according to the evaluation and examination results. Also, the doctors answer all the

doubts of the patient and his family about the disease and treatment. The registered nurses guide COPD patients and their families into the consultation room in an orderly manner. The nurse cooperates with the doctor to complete the patient's physical examination. For patients using inhalers, the nurses evaluate whether the patient can correctly master the inhaler's use. The nurses instruct first-time inhaler patients and their families on using and saving the inhaler correctly. Also, nurses answer any questions patients, and their families have about disease care and provide them with health education, including guidance on proper lip breathing, chest enlargement exercise, and an appropriate diet. Finally, the nurse will inform the patient and his family when the next follow-up visit.

Research Instruments

The five questionnaires were used for collecting data: a demographic questionnaire, COPD self-management scale (CSMS), the Chinese version of chronic obstructive pulmonary disease knowledge questionnaire (COPD-Q), the Chinese version of self-efficacy for managing chronic disease 6-item scale (SES6), and Chinese version of perceived social support scale (PSSS).

The Demographic Questionnaire

The demographic questionnaire was developed by the researcher, specific for this study. Part 1 of the demographic questionnaire contained information about participants' characteristics, which included gender, age, marital status, living condition, residential area, educational level, income level, medical insurance, and occupation status. Part 2 of the demographic questionnaire contained health information of participants which including weight, height, body mass index (BMI), the degree of airflow limitation, smoking status, duration of COPD, history of exacerbation and COPD-related hospitalizations during the previous year, respiratory symptom, comorbidities, daily COPD treatment, source of COPD education.

Participants' self-report obtained the information from part 1 of the demographic questionnaire, and part 2 was obtained from participants' self-report and the medical record.

COPD Self -Management Scale (CSMS)

The CSMS was designed and developed by Zhang et al. (2013) in 2013. The scale includes 5 domains: symptom management, daily life management, emotion management, information management, and self-efficacy. this study only focused on the self-management behaviors of COPD persons. Yang et al. (2019) was modified the CSMS and remained only the 4 domains, and self-efficacy was omitted. Moreover, the modified version CSMS deleted these two items "I do not take steroids (e.g., prednisone or dexamethasone) when I feel serious shortness of breath" and "I do not take anti-inflammatory drugs when I feel serious shortness of breath," deviates from the actual treatment strategy for COPD patients used in the clinic, because this could potentially negatively affect the reliability of the symptom management part of the questionnaire (Yang et al., 2019). So, the modified version COPD self-management scale by Yang et al. (2019) was used to evaluate the level of self-management behaviors of persons among mild to moderate COPD in this study.

The scale consists of 40 items and four dimensions, including: symptom management (items 1,2,3,4,5,6), daily life management (items 12, 13, 14, 16, 17, 19, 23, 26, 27, 28, 29, 30, 31,32), emotion management (items 15, 18, 20, 25, 33, 34, 35, 36, 37, 38,39, 40) and information management (items 7, 8, 9, 10, 11, 21, 22, 24) (Yang et al., 2019). These items were scored using the Likert 5-grade scoring method, and the answer choices were divided into "never, very few, sometimes, often, and always," which gives 1 to 5 points, respectively (Yang et al., 2019). The final dimension score is obtained by dividing the total scores of each dimension by the number of items. The final total score of the CSMS was sum across 40 items, then

divide by 40, which the score range is within 1 to 5 points. The higher score, the better self-management behavior (Yang et al., 2019).

The Cronbach's α coefficient for the modified version of CSMC was .92, which reflects the scale was a reliable instrument to evaluate self-management behaviors of COPD persons (Yang et al., 2019).

COPD Knowledge Questionnaire (COPD-Q)

COPD-Q was published by the Department of Clinical Pharmacy of Tennessee University in 2009 (Maples et al., 2010). In this study, the Chinese version of the COPD knowledge questionnaire was used to measure the COPD knowledge of mild to moderate COPD patients. Maples team translated this scale into Chinese and back translated (Maples et al., 2010).

The scale consists of 13 items, including prevention, clinical manifestation, treatment and risk factors of COPD (Maples et al., 2010). It includes 8 positive knowledge questions are true (items 1, 2, 4, 6, 8, 9, 10, 11) and 5 reverse knowledge questions are false (items 3, 5, 7, 12, 13) (Maples et al., 2010). There are three options for each topic, namely "Yes", "No" and "not sure ". The answer to "yes" to the positive knowledge question scored 1 point, while the answer to "no" or "not sure " scored 0, while the reverse knowledge question score was on the contrary (Maples et al., 2010).

The total score ranges from 0 to 13, with a higher score indicated a higher level of COPD knowledge (Maples et al., 2010). The Cronbach's alpha for the Chinese version of COPD knowledge measure was .74 and .90 (Wang et al., 2014; Wang et al., 2014).

Self-Efficacy for Managing Chronic Disease 6-item Scale (SES6)

The scale was designed by Kate et al. (1996) of Stanford University in the United States. In this study, the SES6 was used to measure the self-efficacy of mild to

moderate COPD persons. Fu et al. (2003) introduced the SES6 to China and translated into Chinese following the back-translation process.

The scale includes two parts: symptom management self-efficacy and disease generality management self-efficacy, with a total of 6 items. The scale adopts the method of view simulation (Fu et al., 2003). The score for each item ranges from 1 to 10, which ranges from "Have no confidence at all" to "Absolutely confident". The total score of the scale was 6 ~ 60 points. The final score is obtained by dividing the total scores of the scale by the number of items (Fu et al., 2003). The higher the scores means the higher the level of self-efficacy (Fu et al., 2003).

The research applied the scale to patients with chronic diseases in China, and the Cronbach's alpha was .95, which showed good reliability (Wang et al., 2019).

Perceived Social Support Scale (PSSS)

The multidimensional scale of perceived social support was developed by Zimet et al. (1990). In this research, the Chinese version of perceived social support scale (PSSS) will be used to measure the level of perceived social support in persons with mild to moderate COPD. The scale was translated into Chinese following the back-translation processes by Jiang (2001).

The scale consists of 3 parts and 12 items, including family support (items: 3, 4, 8, 11), friends' support (items: 6, 7, 9, 12) and others' support (items: 1, 2, 5, 10). The score for each item ranges from 1 to 7, which ranges from " very strongly disagree" to " very strongly agree" (Zimet et al., 1990). The final dimension score is obtained by dividing the total scores of each dimension by the number of items. The final total score of the PSSS was sum across 12 items, then divide by 12, which the score range is within 1 to 7 points. In this approach any mean scale score ranging from 1 to 2.9 could be considered low support; a score of 3 to 5 could be considered moderate support; a score from 5.1 to 7 could be considered high support (Zimet et al., 1990).

The Cronbach's alpha of the self-efficacy scale was .85 and .87, which showed good reliability in China (Tian et al., 2018; Xie et al., 2019).

Psychometric property of the instruments

The Chinese version of all the instruments was used in this study, and they were tested and validated by the experts in some previous studies, which means all instruments had good reliability. The reliability of all the instruments was optimal, as shown by Cronbach's alpha in previous studies. For this study, the reliability of the instruments was tested with 30 participants, and Cronbach alpha of CSMC was .86, the COPD-Q was .80, the SES6 was .93, and the PSSS was .87. For this study with 121 participants, the Cronbach's alpha for SMC was .89, the COPD-Q was .80, the SES6 was .88, and the PSSS was .89.

Protection of human rights

This research was carried out only after the approval of research proposal by the Institutional Review Board (IRB), Burapha University (Protocol code G-HS 041/2564) and the First Affiliated Hospital of Wenzhou Medical University (Protocol code 2021- 095).

Before the data collection process, all participants were carefully informed about the purpose of the study and participating procedures. The researchers had described this study's' aims and procedures involved in the data collection process and emphasized individuals' right to participate or refuse to participate in the research. The data in this study was collected from the individuals who were willing to participate and sign the consent form. The consent form was filled before data collection. Participants were told that they had the right not to answer any questions and had the right to change their minds and withdraw from the study at any time if

they wish. Patients were informed that their denial to be a part of this study would not affect the quality of care they receive from the hospital.

All the forms for collecting data were anonymous, and it was harmless for participants to participate in the study. Confidentiality was maintained, and names or other identifiable information was not disclosed in this study. All the data on the paper files were stored in a secure place for research purpose only, and all electronic data was locked using a password that only the researcher can access. All the data will be destroyed one year after the publication of the research day. In addition, if any individual wants to know the study results, they can contact the researchers.

Data collection

The data collection procedures in this study were conducted by the researcher as follows:

1. After the researcher receiving approval from the Faculty of nursing of BUU, the researcher submitted recommendations for ethical review to IRB of BUU and IRB of the First Affiliated Hospital of Wenzhou Medical University in China.

2. The researcher got permission from the Faculty of nursing of BUU and the First Affiliated Hospital of Wenzhou Medical University in China to collect data on the goals and procedures of the research information.

3. The letter from Faculty of nursing of BUU was sent to the nursing director of the first affiliated Hospital of Wenzhou Medical University. Permission for data collection was asked from the first affiliated Hospital of Wenzhou Medical University, China. The researcher explained the data collection procedures to Respiratory OPD staffs and for well-organized environment during data collection process.

4. Considered the situation about the coronavirus in 2021 (COVID-19), the researcher wore masks all the time and reminded patients to wear masks all the time.

At the respiratory outpatient department entrance, patients were required to go through temperature screening and showed a health QR code (an official way to declare residents' health status). Patients who displayed a green code and temperature below 37.3℃ was allowed entry into the outpatient department.

5. The researcher went to the Respiratory outpatient department from 8:30 am to 11:30 am and from 1:30 pm to 4:30 pm every weekday (Monday to Friday).

6. The researcher randomly selected 50% of these persons as a sample by preparing two sheets of paper of the same size and material and wrote down the "odd numbers" and "even numbers", respectively. The papers were folded and mixed in a prepared bag. Everyday morning, the researcher randomly selected one paper from the bag. Suppose the researcher picked up an "even number" on that day. The researcher collected data from mild to moderate COPD persons with an even number of appointments. After obtaining the selected participants' consent, the researcher instructed them to sign the consent form and fill in the questionnaires.

7. The researcher met and informed the participants and their families about the aim, ethical issues, and human protection of the study. Written consent was signed after the participants understood and were willing. Every participant maintained one-meter social distancing from other participants and researchers.

8. These data were collected through a self-reporting questionnaire in a particular private room. The room was routinely disinfected daily. The participants started filling with the demographic questionnaire followed by COPD-Q, SES6, PSSS, and CSMS questionnaire. The approximate time required was 20-25 minutes for each participant to complete the questionnaires. The researcher ensured that participants could see the doctor on time after the questionnaire was completed.

9. After completing the questionnaires, participants were reminded to take any belongings away. Public goods including pens were disinfected by alcohol cotton after usage.

10. The researcher checked the submitted questionnaires for the completeness of data.

11. This process was repeated until the required sample size was reached.

Data analysis

Data were analyzed using IBM SPSS 26.0 software in this study. The significance level was set at .05, data analysis included:

1. The descriptive statistics was used to describe frequencies, percentages, means, and standard deviations of the mild to moderate COPD persons' demographic data and variables.

2. The Pearson's product moment correlation was used to examine the relationship between COPD knowledge, self-efficacy, perceived social support, and self-management behaviors with mild to moderate COPD.

CHAPTER 4
RESULTS

This chapter presents the results of the data analysis which were described under three sections: demographic characteristics and health information of the participants, description of COPD self-management behaviors and the factors related to self-management behaviors among persons with mild to moderate COPD in Wenzhou, China. The finding of the study presented as follow:

1. Description of participants characteristics and health information
2. Description of COPD self-management behaviors
3. Factors related to COPD self-management behaviors among persons with mild to moderate COPD in Wenzhou, China

Description of demographic characteristics and health information

Demographic characteristics

A total of 121 persons with mild to moderate COPD participated in the study. The mean age of participants was 68.69 ($SD = 9.6$) years, of which 78.5% were male. The majority of the participants were married (89.3%), and 91.7% lived with the family. More than half participants (61.2%) lived in suburban. Among these participants, 61.1% had primary or lower education. About half of the participants (52.9%) had a moderate household monthly income ¥2001- ¥5000 (310.3-775.4 USD). All participants (100%) at Wenzhou had medical insurance. Of these participants, 45.4% were employed, while 33.1% were unemployed. Demographic characteristics of the participants with mild to moderate COPD are presented in Table 1.

Table 1 Frequency, percentage, mean, and standard division of demographics

characteristics of the participants (n =121)

Characteristics	Number (n)	Percentage (%)
Age (years)		
45-59	25	20.7
60-74	59	48.8
75-89	37	30.5
(M = 68.69, SD = 9.6, min = 46, max = 86)		
Gender		
Male	95	78.5
Female	26	21.5
Marital status		
Single	1	0.8
Married	108	89.3
Divorced	2	1.7
Widowed	10	8.2
Living condition		
Alone	10	8.3
Family (spouse and/or children)	111	91.7
Residential area		
Urban	47	38.8
Suburban	74	61.2

Table 1 (Continued)

Characteristics	Number (n)	Percentage (%)
Education level		
Primary or lower*	74	61.1
Junior high school	40	33.1
Senior high school	5	4.1
College or above	2	1.7
Household income (Yuan per month, 1USD = 6.47 CNY)		
≤ 2000 (310.2 USD)	27	22.3
2001- 5000 (310.3-775.4 USD)	64	52.9
5001- 8000 (775.6-1240.7 USD)	25	20.7
≥ 8000 (1240.9 USD)	5	4.1
Medical insurance		
No	0	0
Yes	121	100
Occupation status		
Unemployed	40	33.1
Employed	55	45.4
Business	33	27.3
Professional jobs (doctor/teacher)	7	5.8
Factory workers/ Laborer	15	12.3
Retired	26	21.5

* Graduated from primary school but did not attend junior high school or did not complete primary school

Health information

Health information of the participants consisting of body mass index (BMI), smoking status, duration since diagnosis of COPD, COPD stage, FEV_1, exacerbation history and COPD-related hospitalization within a year, respiratory symptoms, co-morbidities, daily COPD treatment, and source of COPD information are illustrated in Table 2.

As for disease-related characteristics of the participants, the mean BMI of participants was 22.2 kg/m^2 ($SD = 3.6$). 66.1% of participants had normal BMI. 37.2% of the participants reported they had quit smoking. However, 35.5% were currently smoking. The COPD diagnosis duration of the participants ranged from 0.5 (6 months) to 20 years ($M=5.52$, $SD = 3.7$). The mean FEV_1 predicted was 71.3 % ($SD = 12.9$). Regarding disease severity, 73.6% had moderate COPD, 26.4% had mild COPD. 56.2% of participants had experienced exacerbation in the past year. 35.5% of participants reported they had COPD-related hospitalization at least once in the past year. A majority (79.3%) of the participants had at least one respiratory symptom, while the cough (67.8%) was the most symptom they faced. About half of the participants (48.8%) had at least one co-morbidity, while hypertension (35.5%) was the most common co-morbidities. 59.5% of the participants were currently on daily COPD treatment, and 59.5% of them used drugs to control COPD every day. However, 40.5% of participants did not have daily COPD treatment. All participants (100%) reported not participating in the pulmonary rehabilitation program. 77.7% of the participants received COPD information, mainly from physicians (77.7%) and nurses (56.2%). Notwithstanding, some participants (22.3%) indicated that they did not get any COPD information.

Table 2 Frequency, percentage, mean, and standard division of health information of

the participants (n =121)

Health Information	Number (n)	Percentage (%)
Body mass index (kg/m^2)		
< 18.5	20	16.5
18.5-24.9	80	66.1
More than 25	21	17.4
(M = 22.2, SD = 3.6, min = 13.7, max = 31.2)		
Duration of COPD (years)		
< 1	6	5.0
1-5	65	53.7
6-10	41	33.9
< 10	9	7.4
(M = 5.52, SD = 3.7, min = 0.5 (6 months), max = 20.0)		
Smoking status		
Never	33	27.3
Current smoking	43	35.5
Quit smoking	45	37.2
FEV$_1$ (%)		
50-79 (Moderate)	89	73.6
≥ 80 (Mild)	32	26.4
(M = 71.3, SD = 12.9, min = 50.0, max = 104.0)		

Table 2 (Continued)

Health Information	Number (n)	Percentage (%)
Exacerbation history (within 12 months)		
None	53	43.8
1-3	47	38.8
≥ 3	21	17.4
COPD- related hospitalizations (within 12 months)		
None	78	64.5
1-3	32	26.4
≥ 3	11	9.1
Respiratory symptoms		
None	25	20.7
Yes*	96	79.3
Dyspnea	21	17.4
Wheezing	58	47.9
Cough	82	67.8
Expectoration	65	53.7
Co-morbidities		
None	62	51.2
Yes*	59	48.8
Hypertension	38	31.4
Diabetic	13	10.7
Heart disease	16	13.2
Others **	19	15.7

* can answer more than 1 items; ** were osteoporosis, Hyperlipidemia, prostate

cancer, benign prostatic hyperplasia, rectal cancer, lumbar disc herniation

Table 2 (Continued)

Health Information	Number (n)	Percentage (%)
Daily COPD treatment		
No	49	40.5
Yes*	72	59.5
Drug	71	58.7
Oxygen	21	17.4
Traditional Chinese medicine	8	6.6
Pulmonary rehabilitation (PR) program		
No	121	100
Yes	0	0
Source of COPD information		
No	27	22.3
Yes*	94	77.7
Physician	94	77.7
Nurse	53	56.2
Internet	10	8.3
WeChat	16	13.2
Others (family, other COPD persons)	15	12.4

* can answer more than 1 items

Description of COPD self-management behaviors

COPD self-management behaviors consist of symptom management, daily life management, emotion management and information management, as shown in Table 3.

In this study, the self-management scores ranged from 1.4 to 3.9, and the mean score was 2.71 (SD = 0.44). For subscales, daily life management had the highest mean score of 3.35 (SD = 0.51), the item with the highest score was " I will often open the window for ventilation to fill the room with fresh air" (M = 4.71, SD = 0.71). Followed by "In winter, in order to prevent a cold, I will wear enough clothes to keep warm" (M = 4.69, SD = 0.81). The lowest score was "I get flu shots once or twice a year"(M = 1.29, SD = 0.91) (The detail was shown in Table 6, Appendix B).

The mean score of emotion management dimension was 2.57 (SD = 0.54), the item with the highest score was " I think controlling the symptoms can lighten the burden on the family" (M = 3.41, SD = 1.18). Followed by "I will try to look on the bright side of life" (M = 3.31, SD = 0.86). The lowest score was "I will talk to the medical staff about things that are uneasy and annoying. "(M = 1.23, SD = 0.60) (Appendix B).

The mean score of symptom management dimension was 2.48 (SD = 0.76), the item with the highest score was " When dyspnea worsens acutely, I will ask for help (e.g., call first aid or ask family members to help send to the hospital)" (M = 3.99, SD = 0.96). Followed by "I will consciously follow the doctor's advice to take the medicine on time" (M = 3.25, SD = 1.27). The lowest score was "When there is no wheezing, I will have breathing training (such as abdominal breathing, lip contraction breathing)" (M = 1.70, SD = 1.01) (Appendix B).

The mean score of information management was the lowest with score was 1.99 (SD = 0.55), the item with the highest score was "I will keep the disease-related

data completely (e.g., outpatient medical records, examination results, etc.)"
($M = 2.83$, $SD = 1.24$). Followed by "I will discuss with the health care staff other
issues related to the disease (e.g., is the disease contagious?)" ($M = 2.51$, $SD = 0.96$).
The lowest score was " When I consult with the health care staff, I will make a list of
the questions I want to ask."($M = 1.15$, $SD = 0.42$) (Appendix B).

Table 3 Range, mean and standard division of self-management behaviors among the
participants (n = 121)

COPD self-management behaviors	Range		*M*	*SD*
	Possible Score	Actual Score		
COPD self-management behaviors	1-5	1.4-3.9	2.71	.44
Symptom management	1-5	1- 4.8	2.48	.76
Daily life management	1-5	1.4 - 4.4	3.35	.51
Emotion management	1-5	1.3 - 4.3	2.57	.54
Information management	1-5	1- 3.6	1.99	.55

Factors related to COPD self-management behaviors among persons with mild to moderate COPD in Wenzhou, China

The factors related to COPD self-management behaviors including COPD
knowledge, self-efficacy, and perceived social support.

Table 4 showed that the COPD knowledge scores ranged from 0 to 12, with
a mean of 5.45 ($SD = 3.30$). The self-efficacy score ranged from 1.83 to 9.67 with a
mean score of 6.28 ($SD = 1.75$). Perceived social support consists of family support,
friend support and other support. The score of total perceived social support ranged
within 1.33 to 6.83, with a mean score of 4.27 ($SD = 1.06$). The mean score of family

support was 5.51 (*SD* = 0.88), the mean score of friend support was 3.50 (*SD* = 1.47), and the mean of other support was 3.76 (*SD* = 1.39).

Table 4 Range, mean and standard division of COPD knowledge, self-efficacy, and
perceived social support among the participants (n = 121)

Independent variables	Range		*M*	*SD*
	Possible Score	**Actual Score**		
COPD knowledge	0-13	0-12	5.45	3.30
Self-efficacy	1-10	1.83-9.67	6.28	1.75
Perceived social support	1-7	1.33-6.83	4.27	1.06
Family support	1-7	1.75-7.00	5.51	0.88
Friend support	1-7	1.00-6.75	3.50	1.47
Other support	1-7	1.00-7.00	3.76	1.39

The normal distribution of the variables was tested through skewness/ standard error and Kolmogorov-Smirnov test. All variables conform to a normal distribution. Correlations of independent variables with COPD self-management behaviors of participants with mild to moderate COPD used Pearson's product-moment test to analyze, and the results are displayed in Table 5.

There was a significant positive correlation between COPD knowledge ($r = .50$, $p < .001$) self-efficacy ($r = .29$, $p = .001$) perceived social support ($r = .49$, $p < .001$) and COPD self-management behaviors.

Table 5 Association between COPD knowledge, self-efficacy, perceived social support and COPD self-management behaviors (n = 121)

	COPD Self-management behavior	*P* - value
COPD knowledge	.50	< .001
Self-efficacy	.29	.001
Perceived Social support	.49	< .001

CHAPTER 5
CONCLUSION AND DISCUSSION

This chapter delineates and discussion of the study results, conclusion, implication, and recommendation for future research.

Summary of this study

The purposes of this research were to describe self-management behaviors among persons with mild to moderate COPD and to investigate the relationship among COPD knowledge, self-efficacy, perceived social support and self-management behaviors among persons with mild to moderate COPD in Wenzhou, China. The conceptual framework of this research was based on individual and family self-management theory (IFSMT) by Ryan and Sawin (2009). This study used simple random sampling to recruit 121 participants at the respiratory outpatient department (OPD) of the first affiliated Hospital of Wenzhou Medical University in Wenzhou, China. Data collected using self-reported questionnaires, which include demographic questionnaire, COPD self-management scale (CSMS) (Yang et al., 2019), Chinese version COPD knowledge questionnaire (COPD-Q) (Maples et al., 2010). Chinese version self-efficacy for managing chronic disease 6-item scale (SES6) (Fu et al., 2003) and Chinese version perceive social support scale (PSSS) (Jiang, 2001). Cronbach's alpha for the CSMS, the COPD-Q, the SES6 and the PSSS were .89, .80, .88 and .89 respectively.

The research found that participants' age ranged from 46 to 86 years, with a mean age of 68.69 ($SD = 9.6$). Most of the participants were male (78.5%), married (89.3%), primary or lower education (61.1%), and lived in suburban (61.2%). Among this research, most participants reported that they lived with family (91.7%) and had a monthly household income of ¥2001- ¥5000 (310.3-775.4 USD) (52.9%). All

participants (100%) had medical insurance. Of these participants, 45.4% were employed, while 33.1% were unemployed.

Based on participants' health information, the study found that COPD duration ranged from 0.5 to 20.0 years, with a mean duration of COPD of 5.52 ($SD = 3.7$) years. 66.1% of participants had normal BMI. 73.6% of the participants were moderate COPD, and 26.4% were mild COPD. 72.7% of the participants had a history of smoking, and 35.5% were currently smoking. In the past 12 months, 56.2% of the participants had an exacerbation history. 35.5% have been admitted to the hospital at least once. Among persons with mild to moderate COPD, about 79.3% reported having at least one respiratory symptom, and 48.8% had at least one co-morbidity. Nearly 59.5% of participants were through daily COPD treatment to control their condition, whereas 40.5% were without any treatment. Most of the participants (77.7%) reported that they received health education about COPD mainly came from physicians. However, 22.3% of the participants indicated that they did not receive any instruction about COPD. It is noteworthy that all participants (100%) reported that did not participating in a pulmonary rehabilitation program.

The mean score of overall COPD self-management behavior was 2.71 ($SD = 0.44$). Self-management behavior scores were low, indicating that the persons with mild to moderate COPD had poor self-management behaviors. For all participants, the highest scores were in the domain of daily life management behaviors 3.35 out of 5 ($SD = 0.51$), while the lowest scores were in information management behaviors 1.99 ($SD = 0.55$). In addition, emotion management scores 2.57 ($SD = 0.54$) were higher than symptom management scores 2.48 ($SD = 0.76$). The mean score of COPD knowledge was 5.45 ($SD = 3.30$). Participants reported mean score of perceived social support was 4.27 out of 7 ($SD = 1.06$), which means the participants had moderate perceived social support.

There was a significant positive relationship between self-management behavior with COPD knowledge ($r = .50$, $p < .001$), perceived social support ($r = .49$, $p < .001$), and self-efficacy ($r = .29$, $p = .001$).

Discussion

COPD self-management behaviors among persons with mild to moderate COPD

In this study, the mean score of COPD self-management behaviors among persons with mild to moderate COPD was 2.71 out of 5 ($SD = 0.44$). Comparing with other studies in COPD self-management behaviors in COPD persons, the present study finding was a little bit lower than others. The other research showed that the mean scores of CSMS was 3.07, 2.82, 3.18 (Liu, 2019; Tao et al., 2019; Yang et al., 2019). It meant that persons with mild to moderate COPD in Wenzhou had lower self-management behaviors.

From the results of the subscale of CSMS, the highest score was daily life management ($M = 3.34$, $SD = 0.53$), higher than other studies from China. The other studies showed that the mean score of daily life management was 3.00, 3.10 and 3.05 (Yang et al., 2019; Huang, 2017; Liu, 2019). It is implied that the participants of this study had mild and moderate COPD, although they could still maintain and manage everyday daily life because of mild or asymptomatic. It is worth noting that the lowest score item was "I get flu shots once or twice a year" ($M = 1.30$, $SD = 0.52$). Most participants did not receive vaccinations every year. This could be due to the inadequate education about influenza vaccination to COPD persons in Wenzhou, and patients are unaware of the benefits. In addition, the flu vaccine is a self-funded project, which will cause additional financial burdens to the COPD population.

In this research, the mean score of emotion management was 2.56 out of 5 ($SD = 0.55$), which was a little bit lower than the research of Huang (2017) ($M = 2.89$)

and Liu (2019) (M = 2.86).The participants had unideal emotion management . The mean score of symptom management was 2.47 out of 5 (SD = 0.79) in this study. Previous studies in COPD persons reported that symptom management dimension has the low score (M = 2.68, 3.02, 2.80) (Huang, 2017; Liu, 2019; Tao et al., 2019), but the score of the symptom management dimension in this study was lower than others, which shows that symptom management was deficiency. From the results of the subscale of CSMS, it could be found that the lowest score was information management (M = 1.96, SD = 0.55), which was lower than other studies in COPD persons. The other research showed that the mean score of information management was 2.96, 2.55 and 2.38 (Liu, 2019; Tao et al., 2019). This shows that information management was unsatisfactory for people with mild to moderate COPD in Wenzhou.

In this study, the total score of CSMC was lower than other studies in China. In the subscale of CSMC, except the scores of daily life management, the scores of other domains such as symptom management, emotion management, and information management were lower than that of other studies, which means that the level of self-management behaviors in people with mild to moderate COPD in Wenzhou, China was low.

The results of the low level self-management behaviors among persons with mild to moderate COPD persons in this study can be explained through the IFMST, which shows that condition specific such as complexity condition and treatment, physical and social environmental factors such as residential area and work status, individual and family factors such as education and gender, have related to self-management behavior outcome, which impact to COPD self-management behaviors of persons in this study (Ryan & Sawin, 2009).

Previous studies have shown that the severity of the disease is related to people's self-management behavior (Wang et al., 2017). Severe COPD patients experience repeated deterioration of symptoms and are more willing to control their

symptoms by taking medications on time, using bronchodilators when shortness of breath, and using effective sputum expectoration methods (Liu, 2019; Tao et al., 2019). In this study, 26.4% of participants were mild COPD and 73.6 % were moderate COPD. 79.3% of participants reported respiratory symptoms, but the main symptoms were cough (67.8%) and expectoration (53.7%). In China, almost all COPD persons think that cough and sputum are caused by smoking and aging, not by COPD (Sun & Zhou, 2019). The milder symptoms enable mild and moderate people to maintain everyday daily life. So, few COPD persons choose breathing training, effective methods of cough and sputum to improve symptoms (Tao et al., 2019). In this study, 61.2% of participants reported of never performing breathing training (e.g., abdominal respiration, pursed-lip breathing). 47.1% and 23.1% of the participants indicated that they rarely or never used effective methods to control cough and expectoration. In addition, because of mild symptoms and relatively good lung function, persons with mild to moderate COPD do not visit outpatient frequently, resulting in a lack of disease management information, leading to the problematic self-management behavior of persons with mild to moderate COPD (Barrecheguren et al., 2018; Fazleen & Wilkinson, 2020)

For treatment condition, although the GOLD guideline reported that the effect of treatment intervention might vary depending on the severity of the disease because of the complex condition of COPD (GOLD, 2020). According to the IFSMT, Ryan and Sawin (2009) suggested that the treatment can influence the self-management efforts of individuals and families. However, the clinic resources currently mainly focus on treating severe or very severe COPD, and few have focused on mild to moderate COPD, so there is a lack of evidence supporting standard management programs of COPD (Singh et al., 2019). The results of a qualitative study show that moderate COPD patients indicated, they did not receive appropriate and satisfactory self-management programs from doctors and nurses, so they could

not perform effective self-management behaviors (Molin et al., 2020). There is no more appropriate management and treatment plan for mild to moderate COPD, leading to lower-level self-management behaviors in China (Sun & Zhou, 2019). In this study, 40.5% participant reported that they did not have daily COPD treatment. All participants (100%) were not joining part of a pulmonary rehabilitation program. These may lead to low level of self-management behaviors in this study.

Age is one of the key factors affecting COPD self-management behaviors. Yang et al. (2019) shows that the groups of COPD persons which age less than 60 years have better self-management behaviors than over 60 years old. This may be because middle-aged people have a better ability to accept COPD information and are more willing to accept changes in healthy behaviors. In addition, various functions of the body decline and health conditions become worse with age increase, which makes the population's ability to solve problems and cope with diseases weakened, causing deterioration of self-management behaviors (Huang, 2017). In this study, about 48.8% participants were the age group of 60-74 and 30.5% were belong to the group of 75-89, which may lead to self-management behaviors was insufficient.

Gender has an impact on the health behaviors of the COPD population (Jia et al., 2018). Bringsvor et al. (2018) indicated that women with COPD are more positive and active in engagement in life than men, which females are more willing to follow with interest and perform self-management behaviors. Additionally, in Chinese culture, women have always played the role of caregivers in the family and are better at managing the health of themselves and their families. Zhang et al. (2013) proved that the level of self-management behaviors in females with COPD is higher than that of males. In this study, 78.5% of the participants were men, while only 21.5% were women. This may be related to undesirable self-management behaviors.

Educational level is considered a factor to be related to COPD self-management behaviors. This study found that almost all participants had an education

level of junior high school or lower (94.2%), which means the level of education was low. The studies found that the self-management behaviors of COPD persons in high school and above is higher than that of primary school and below (Yang et al., 2019; Zhang et al., 2013). A study in the United States reported that literacy might play an essential role in controlling COPD because it requires practical self-management skills and medical system navigation to improve the quality of life and avoid life-threatening deterioration (Kiser et al., 2012). Similarly, research in China has shown that patients with higher levels of education are more able to actively use various advances to obtain COPD-related information, which is very important for persisting in self-management behaviors (Huang, 2017).

Work status may have an impact on self-management behaviors. Because of respiratory symptoms, particularly dyspnea, COPD persons tend to adopt a sedentary lifestyle, which decreases their physical condition. Paid work can help people keep up with regular life by requiring them to be at least somewhat physically active (Andenæs et al., 2014). Ding et al. (2017) reported that people with COPD actively manage their disease and engage in healthy behaviors to maintain their ability to work typically, maintain a sense of well-being and self-worth, and a sense of contribution to society. In addition, Patients unemployed or retired reduce social activities and increase social isolation, which led to negative emotions and affected their self-management behaviors (Disler et al., 2012; Zhang et al., 2012). In the present study, 33.1% of participants were not working, and 21.5% were retired, which may made low self-management behaviors.

Comorbidity may be an important factor leading to low self-management behaviors. COPD often coexists with other diseases (comorbidities) that may have a significant impact on health outcomes (GOLD, 2020). The study of Bringsvor et al. (2018) have shown that comorbidity can be associated with emotional distress, reducing COPD people's adherence to self-management. Also, the study of China

showed that comorbidity was associated with self-management behaviors (Huang, 2017). According to the IFSMT, Ryan and Sawin (2009) suggested that the complexity of disease can influence the self-management efforts of individuals and families. In this study, 48.8% of the participants had comorbidity, and 15.7% had more than one comorbidity that it may cause these participants report low self-management behaviors.

In this study, it was found that 61.2% of participants lived in rural areas. The residential areas are related to personal self-management behaviors; previous studies found COPD people living in urban areas had better self-management behaviors such as quitting smoking, performing regular exercise, and healthy eating habits than people in rural areas in China (Yan et al., 2017). In addition, the research of Zhu et al. (2017) reported that rural COPD populations (especially persons in the early stages of the disease) had no understanding about their disease state and lower awareness regarding COPD risk factors, poor quit smoking compliance, poor coping with breathlessness, and less interest in seeking medical attention. In foreign countries studies have also reported that the rural area is relatively large, the transportation is inconvenient, reduces the opportunities for individuals to enter health centers to obtain hospital services, which is essential for COPD self-management behaviors (Disler et al., 2012; Yadav et al., 2020).

Lack of access to COPD information may be a reason for low self-management behaviors among participants. Previous research has shown that access to information from health providers is a crucial factor associated with COPD self-management behaviors (Gupta et al., 2019; Yadav et al., 2020). A study in Korea has found that COPD persons who have regular and frequent clinic visits are better able to obtain more information about COPD and are better able to adopt healthy behaviors (Park et al., 2020). However, the present study found that 22.3% of participants reported did not receive any information about COPD. Furthermore, 77.7% of the

participants indicated that they received information about COPD mainly from doctors (77.7%) and nurses (56.2%), this may cause the lowest score of information management ($M = 1.99$, $SD = 0.55$) in this study.

This result is consistent with previous studies. Due to the single source of COPD information, patients who have limited sources of information about COPD may lead to lower self-management behaviors. The results of a meta-analytic study showed that people with access to the internet, mobile phones for more information about the disease, and frequent exchange of information with others patients were more likely to contribute to higher self-management behaviors (Schulman-Green et al., 2016). Hua and O'uyang (2017) found that COPD persons did not gather information about COPD through multiple sources because of aging and low literacy levels. Moreover, the COPD persons had reduced hospital visits due to the COVID-19, depriving patients of more access to information about COPD from health providers (Liang et al., 2020). In this study, the mean age of participants was 68.69 ($SD = 9.6$), and 94.2% were junior high school or lower, which means the participants were aging and had low education level. In Wenzhou, the hospital visits process becomes cumbersome, as the participants visits are declined due to COVID-19. This leads the participants in this study lack COPD information and report low self-management behaviors.

Factors related to self-management behaviors among persons mild to moderate COPD

This study found that COPD knowledge ($r = .50$, $p < .001$) and social support ($r = .49$, $p < .001$) had a significant relationship at moderate level with COPD self-management behavior. There was a low level significant positive relationship between self-management behaviors and self-efficacy ($r = .29$, $p = .001$).

COPD knowledge and self-management behaviors were associated in mild to moderate COPD populations, consistent with the hypothesis of this study. The

finding suggests that a high level of COPD knowledge was associated with a high level of self-management behaviors. This result was consistent with many studies which found that COPD knowledge was positively associated with COPD self-management behaviors in different settings and across disease stages (Cong et al., 2020; Gupta et al., 2019; Yang et al., 2019). The IFSMT explained that improvement of knowledge would increase the understanding of self-management behaviors of persons, noted that enhancement of knowledge and specific health beliefs are linked to engagement in self-regulation behaviors, which leads to engagement in self-management behaviors (Ryan & Sawin, 2009). Regular acquisition of knowledge about disease management enables persons to make more confident for self-management decisions (Disler et al., 2012).

Unfortunately, the participant in this study had low level of COPD knowledge, which the mean score of COPD knowledge was 5.45 out of 12 (*SD* = 3.3). Consistent with Lee et al. (2020) and Yang et al. (2019) which found that COPD persons lack COPD knowledge. Lee et al. (2020) also found that that COPD knowledge was lower in people with mild to moderate COPD compared to severe COPD. COPD people having a lack of knowledge may lead to adverse consequences, including a lack of awareness of the effectiveness of self-management strategies, the importance of COPD treatment and self-management, and the long-term effects (Cong et al., 2020; Wong & Yu, 2016). COPD persons had unideal identifying disease risks, and treatment makes persons' health behaviors unsatisfactory such as decreased medication adherence and periodic clinic visits (Cong et al., 2020; Di Marco et al., 2019).

Moreover, mild to moderate COPD persons had mild symptoms and fewer barriers to daily activities so they did not concern about health care resources and reduced communication with health care providers, which led them to get low skills to manage disease symptoms and no more recognition of disease management

(Barrecheguren et al., 2018; Koo et al., 2018). In the current study, all participants were mild to moderate COPD, of which 22.3% of participants reported not receiving information about COPD from doctors and nurses. Another reason was the low level of education of the participants in this study, which affect their learning and understanding of COPD knowledge and information. Thus, in this study, a low level of COPD knowledge may be a reason for unideal COPD self-management behaviors.

The present study shows that self-efficacy was related to self-management behaviors among persons with mild to moderate COPD. This finding of our research is consistent with the results of other national and international research that imply that the higher level of self-efficacy is related to a higher level of self-management behaviors (Fan et al., 2019; Irani et al., 2019; Tsiligianni et al., 2020). According to the IFSMT, self-efficacy refers to a person's confidence and ability to successfully perform a behavior under both normal and stressful circumstances (Ryan & Sawin, 2009). The individual's confidence is critical to developing self-management behavior, especially as COPD self-management becomes progressively more burdensome and complex. COPD persons with high confidence in disease management are more persistent in functional exercise capacity, smoking cessation, and adherence to medications (Qi et al., 2013; Fan et al., 2019). Therefore, the positive correlation between self-efficacy and self-management behaviors found in the present study is understandable.

The IFSMT mentions that individuals and families develop self-efficacy when acquiring knowledge and beliefs, which will improve self-management outcomes. Qi et al. (2013) showed that a lack of skills and knowledge to cope with COPD exacerbation would reduce patients' self-efficacy. Low self-efficacy was related to poor exercise and low-level cognitive symptom management behaviors, which were not conducive to healthy behaviors (Tao et al., 2019). In this study, the

participants' lack of COPD knowledge made the participants have no high self-efficacy mean score *(M* = 6.28, *SD* = 1.75), leading to a low self-management score.

This study finding that perceived social support and self-management behavior have a moderate positive correlation (*r* = .49, *p* <.001), implying that COPD patients with higher levels of social support would be more likely to perform more self-management behaviors. Previous research supports the result of this study, which higher social support is associated with higher physical exercise, vaccination, and higher levels of pulmonary rehabilitation (Chen et al., 2017; Lenferink et al., 2018; Xie et al., 2019). Ryan and Sawin (2009) explained in the IFSMT that social support could help improve knowledge, improve self-regulation skills, and improve self-efficacy, thereby increasing self-management behaviors. People with higher levels of social support are more likely to gain active health-promoting behaviors and strengthen coping strategies under stressful situations, thereby enhancing self-management capabilities (Chen et al., 2017; Lenferink et al., 2018). Therefore, the positive correlation between social support and self-management behaviors found in the present study is understandable.

The perceived social support score of the current study, the family support scored higher than friends and other support, meaning that participants received more support from their family than friends and others. This may be due to the high value placed on family and kinship in Chinese and Wenzhou cultures. Family can play a decisive role in treating chronic illnesses by providing instrumental support and unconditional support, and opportunities to express emotions (Liu et al., 2018). The finding supports this that 91.7% of participants live with their families. However, some studies believe that although patient perceive high family support, it does not mean that family members participants in patients' disease (Kosteli et al., 2017; Lenferink et al., 2018). This result may be explained by Chinese patients with a mild condition always choose to hide the disease from family members to maintain daily

life, which lead family members cannot effectively participate in managing the patient's disease (Fan et al., 2019). In addition, the participants' mean age was 68.7 (*SD* = 9.6), which means that their partners were also aging or ill, preventing them from giving more support to the participants, which was not conducive to the participants developing good self-management behaviors.

Another reason may be that COPD receives less attention and provides fewer resources than other chronic diseases like diabetes, hypertension, and cancer. In the health policy introduced in China, community hospitals do not include COPD in the community health management services (Tao et al., 2019). It means that COPD populations receive less support from staff in the community and other health delivery centers in their daily lives, including providing COPD information and education and follow-up of treatment options (Cong et al., 2020). In addition, in this study, 78.5% of participants were males. Men were less willing to talk about the disease with others, including friends, and exchange information about the disease with fellow patients, which leaves COPD persons with less perceived social support and impact the score of self-management behaviors (Tao et al., 2019). Thus, low levels of perceived social support and lower self-management behaviors were associated in this study.

The results of this study showed that COPD knowledge had a significant correlation at moderate level with COPD self-management behavior ($r = .50$, $p < .001$). Perceived social support had a significant correlation at moderate level with COPD self-management behaviors ($r = .49$, $p < .001$). There was a weak level significant positive relationship between self-management behaviors and self-efficacy ($r = .29$, $p = .001$). The results were in line with the hypothesis of this study. Therefore, improving COPD knowledge, self-efficacy, and social support can promote better self-management behavior in persons with mild to moderate COPD in Wenzhou, China.

Implications of the findings

This study results showed that 29.5% of participants were still smoking, 39% were not in daily treatment, and all participants were not participating in a pulmonary rehabilitation program. These increase the risk of exacerbation and hospitalization for participants. Unfortunately, the exacerbation and hospitalization happened already in participants. 59% of participants reported presenting with at least one exacerbation experience within a year, while 39% reported being hospitalized. Therefore, health care providers should increase advocacy and supervision of smoking cessation in mild and moderate COPD persons, proved smoking cessation plan. The government should incorporate COPD self-management into community chronic disease management programs. Which better follow up with patients and families to provide timely COPD information and promote skills such as oxygen therapy, medication taking, respiratory muscle exercises, and physical activities, which will improve their self-management behaviors.

Nursing practice

This study showed that the self-management behaviors of people with mild to moderate COPD in Wenzhou were not ideal. In particular, the information management, we recommend that the health providers should give more education to persons with mild to moderate COPD about COPD's causes, treatment, and rehabilitation care plans. Encourage communities to establish COPD rehabilitation associations to regularly educate and guide persons and their families about COPD rehabilitation to raise awareness and attention regarding COPD. In addition, health care providers should also pay attention to mild to moderate COPD characteristics and develop personalized self-management plans for them and their families.

This study provided useful information about self-management behaviors and its related factors of persons with mild to moderate COPD in Wenzhou, China. This information provided basis for drawing up intervention to forte change self-

management behaviors by targeting COPD knowledge, person self-efficacy, and social support.

Nursing Administration

With the support of this research, nurse administrators can incorporate self-management behaviors assessment and education for people with mild to moderate COPD into job descriptions. Administrators can also include self-management behaviors in the nursing care standard for persons with mild to moderate COPD.

Nursing Education

Findings from the present study provide evidence for nursing knowledge about the relationship between COPD knowledge, self-efficacy, perceived social support, and self-management behaviors among persons with mild to moderate COPD. The results can be applied to health education as good instruction about mild to moderate COPD persons' care, and provide a valuable reference for teaching OPD knowledge, self-efficacy, perceived social support, and COPD self-management behaviors in other fields. Results of the present study can also serve as a reminder for nurse educators to take COPD persons' self-management behaviors and COPD knowledge, self-efficacy, and perceived social support into consideration while developing teaching-learning content about COPD care.

Recommendations for future Nursing research

The study enrolled participants from only a hospital in Wenzhou, which results may not represent the characteristics of the mild to moderate COPD population in the entire Wenzhou, China. To generalize the results to the mild to moderate COPD population in Wenzhou, we recommend replicating this study in multiple settings. Furthermore, the present study is only observational, and can thereby only establish a correlation, but not a cause-effect relationship between COPD knowledge, self-efficacy, perceived social support, and self-management behaviors.

The results suggest that further research is needed to examine COPD knowledge, self-efficacy, perceived social support influencing the COPD self-management behaviors in mild to moderate COPD. Further intervention studies are needed to strengthen this relationship and to determine the exact methods that can be effective for improving COPD knowledge, self-efficacy, perceived social support, and self-management behaviors.
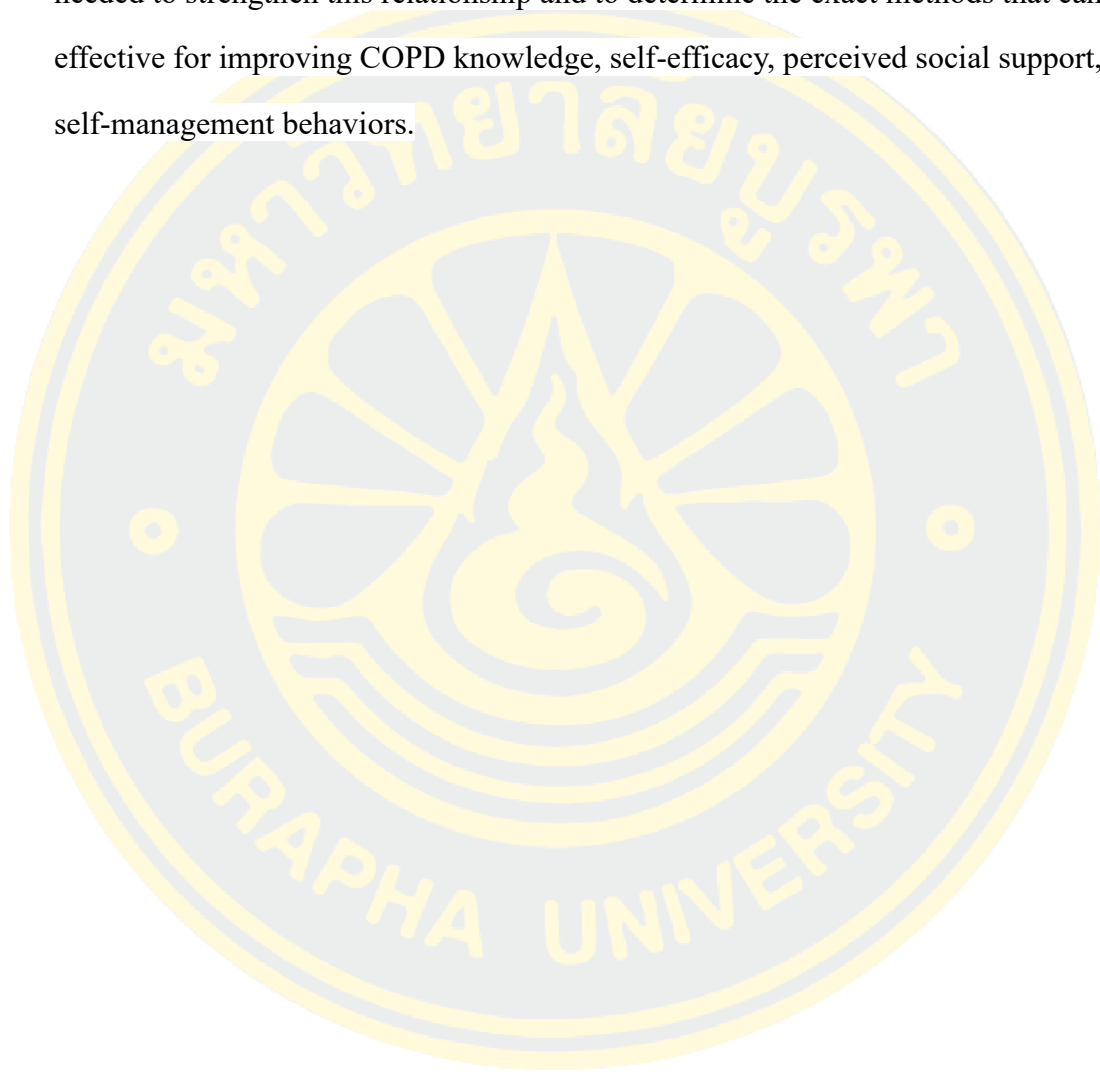
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APPENDICES

APPENDIX A

Questionnaires in English version

1.The Demographic Questionnaire

Direction: Please read the questions in part 1 and part 2 carefully and give an honest answer. Please choose the answer as follow by tick □ or write down your answers in the space provided.

Part 1: General information (To be completed by the participant)

1. Age: _____

2. Gender:

   □ Male   □ Female

3……………………….…to………………………….8

9. Medical insurance

   □ Fully covered   □ Partially covered   □ No insurance

10. Working status

   □ Not currently working □ Working full time □ Working part time □ Retired

Part 2: Health information (To be collected by the researcher from the patient record)

1. Years diagnosed with COPD:_____years

2. Height:____m; Weight:____kg; BMI:____kg/m^2

3…………………………….…to………………………….9

10. Participated in a rehabilitation

   □ No

   □ Pulmonary rehabilitation

   □ Other rehabilitation

11. Source of COPD education

   □ No

   □ Yes (□ Physician □ Nurse □ Internet □ Wechat □others_____)

2. COPD Self- Management Scale (CSMS)

Direction: We would like to know what you do to management your condition in your daily life. Please read and think about it carefully and choose the suitable one on your condition. Please choose the answer as follow by tick ☐

Item	Never	Very Few	Sometimes	Often	Always
1. When there is no wheezing, I will have breathing training (e.g., abdominal respiration, pursed lip breathing).	1	2	3	4	5
2. When I find it difficult to breathe, I inhale bronchodilators (e.g., aminophylline, salbutamol, terbutaline).	1	2	3	4	5
3. When I have difficulty breathing, I will take oxygen at 1-2 L/min.	1	2	3	4	5
4 ……………………………………	1	2	3	4	5
5. ……………………………………	1	2	3	4	5
6. ……………………………………	1	2	3	4	5
7. ……………………………………	1	2	3	4	5
8. ……………………………………	1	2	3	4	5
9. ……………………………………	1	2	3	4	5
10. ……………………………………	1	2	3	4	5
11. ……………to………………38	1	2	3	4	5
39. If there are troubles, I will confide in my relatives and friends.	1	2	3	4	5
40. When I am in a bad mood, I will ask my friends or family for comfort and help.	1	2	3	4	5

3. COPD Knowledge Questionnaire (COPD-Q)

Direction: This questionnaire asks you about your knowledge of COPD, and we can learn your understanding about COPD through this questionnaire. Please answer the following questions as honestly and clearly as possible, and judge by your understanding, and tick in the "YES" or "NO" box. If you do not understand the question or do not know the correct answer, please tick in the " NOR SURE" box.

Item	YES	NO	NOT SURE
1.People with COPD should get a pneumonia vaccine injection.			
2. Inhaling oxygen at home can help a patient with COPD live longer.			
3. …………………………………….			
4. …………………………………….			
5. …………………………………….			
6. …………………………………….			
7. …………………………………….			
8. …………………………………….			
9. …………………………………….			
10. ……………………………………			
11. …………………………………….			
12. People should only use their COPD inhaler (drug) when they can't breathe.			
13. COPD can be reversed.			

4. Self-Efficacy for Managing Chronic Disease 6-item Scale

Direction: We would like to know how confident you are in doing certain activities. For each of the following questions, please choose the number that corresponds to your confidence that you can do the tasks regularly at the present time.

1. How confident do you feel that fatigue caused by illness will not affect what you want to do?

| not at all confident | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | totally confident |

2. ………………………………………… …………………………………………..

| not at all confident | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | totally confident |

3. ………………………………………… …………………………………………..

| not at all confident | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | totally confident |

4. ………………………………………… …………………………………………..

| not at all confident | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | totally confident |

5. ………………………………………… …………………………………………..

| not at all confident | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | totally confident |

6. How confident do you feel to do something other than taking medicine as directed by your doctor (e.g., pay attention to diet and exercise) to reduce the impact of your conditions on your daily life?

| not at all confident | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | totally confident |

5. The Perceived Social Support Scale (PSSS)

Direction: There are 12 sentences, each question has 7 answer. Please choose an answer after each sentence according to your actual situation. For example, choose "1" means you really strongly disagree with this sentence, which state that your actual situation does not agree with this sentence; choose "7" means your actual situation does agree with this sentence; choose "4" means in the middle of state; and so on.

Item	Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Agree	Strongly Agree	Very Strongly Agree
1.There is a special person (leaders, relatives, colleagues) who is around when I am in need.	1	2	3	4	5	6	7
2. ……………………	1	2	3	4	5	6	7
3. ……………………	1	2	3	4	5	6	7
4……………………	1	2	3	4	5	6	7
5……………………	1	2	3	4	5	6	7
6……………………	1	2	3	4	5	6	7
7……………………	1	2	3	4	5	6	7
8……………………	1	2	3	4	5	6	7
9……………………	1	2	3	4	5	6	7
10.……………………	1	2	3	4	5	6	7
11……………………	1	2	3	4	5	6	7
12.I can count on my friends when things go wrong.	1	2	3	4	5	6	7

APPENDIX B

Responses to questions on COPD Self-management Scale (CSMS) and COPD

Knowledge Questionnaires (COPD-Q) (Number and present of participants)

Table 6 showing frequency, mean, standard division of each score in each item of

COPD self-management scale (n = 121)

N (%) Item	Never 1	Very Few 2	Sometimes 3	Often 4	Always 5	M	SD
Symptom management							
1. When there is no wheezing, I will have breathing training (e.g., abdominal respiration, pursed lip breathing).	74 (61.2)	19 (15.7)	19 (15.7)	8 (6.6)	1 (0.8)	1.70	1.01
2. When I find it difficult to breathe, I inhale bronchodilators (e.g., aminophylline, salbutamol, terbutaline).	69 (57)	12 (9.9)	10 (8.3)	19 (15.7)	7 (9.1)	2.10	1.45
3. When I have difficulty breathing, I will take oxygen at 1-2 L/min.	92 (76)	8 (6.6)	3 (2.5)	6 (5.0)	12 (9.9)	1.66	1.33
4. I will consciously follow the doctor's advice to take the medicine on time.	12 (9.9)	23 (19)	35 (28.9)	25 (20.7)	26 (21.5)	3.25	1.27
5. When dyspnea worsens acutely, I will ask for help (e.g., call first aid or ask family members to help send to the hospital).	6 (5.0)	2 (1.7)	14 (11.6)	64 (52.9)	35 (28.9)	3.99	.96
6. When coughing and expectorating sputum, I will use effective methods to remove respiratory sputum (e.g., effective coughing, chest percussion, atomization inhalation).	28 (23.1)	57 (47.1)	21 (17.4)	15 (12.4)	0 (0)	2.19	.93

Table 6 (Continued)

N (%) \ Item	Never 1	Very Few 2	Sometimes 3	Often 4	Always 5	*M*	*SD*
Daily life management							
12. I get flu shots 1-2 / year.	89 (73.6)	29 (24.0)	3 (2.5)	0 (0)	0 (0)	1.29	0.91
13. I will conduct cold protection training (such as washing my face with cold water in summer and autumn).	38 (31.4)	21 (17.4)	37 (30.6)	20 (16.5)	5 (4.1)	2.45	1.21
14. I will avoid eating raw, cold, hard food.	8 (6.6)	29 (24.0)	24 (19.8)	42 (34.7)	18 (14.9)	3.27	1.18
16. I will avoid eating foods with too much sugar and too many calories (such as soda, cola, etc.).	12 (9.9)	25 (20.7)	31 (25.6)	41 (33.9)	12 (9.9)	3.13	1.15
17. When there is no edema and more phlegm, I will drink more water.	1 (0.8)	22 (18.2)	30 (24.8)	36 (29.8)	32 (26.4)	3.63	1.09
19. In cold weather, I will use heating facilities to increase the room temperature.	7 (5.8)	5 (4.1)	14 (11.6)	33 (27.3)	62 (51.2)	4.14	1.14
23. I will adjust my exercise according to my physical condition (if something goes wrong, walk around the house).	5 (4.1)	27 (22.3)	34 (28.1)	46 (38.0)	9 (7.4)	3.22	1.01
26. when my condition is stable, I exercise more than 2-3 hours a week.	11 (9.1)	15 (12.4)	14 (11.6)	38 (31.4)	43 (35.5)	3.72	1.31

Table 6 (Continued)

N (%) Item	Never 1	Very Few 2	Sometimes 3	Often 4	Always 5	*M*	*SD*
27. In winter, in order to prevent a cold, I will wear enough clothes to keep warm.	3 (2.5)	1 (0.8)	6 (5.0)	10 (8.3)	101 (83.5)	4.69	0.81
28. I will take care to avoid inhalation of dust, smoke or harmful gases.	18 (14.9)	44 (36.4)	19 (15.7)	23 (19.0)	17 (14.0)	2.81	1.30
29. I will choose appropriate ways to exercise (such as walking, jogging, climbing ladders, cycling, Taijiquan, etc.).	17 (14.0)	41 (33.9)	28 (23.1)	20 (16.5)	15 (12.4)	2.79	1.24
30. I will do housework according to my physical condition, such as cleaning, shopping and so on.	8 (6.6)	11 (9.1)	18 (14.9)	46 (38.0)	38 (31.4)	3.79	1.18
31. I will adjust sport velocities according to my health status.	12 (9.9)	22 (18.2)	24 (19.8)	55 (45.5)	8 (6.6)	3.21	1.21
32. I will often open the window for ventilation to fill the room with fresh air.	2 (1.7)	1 (0.8)	3 (2.5)	18 (14.9)	97 (80.2)	4.71	0.71
Emotion management							
15. I think controlling the symptoms can lighten the burden on the family.	11 (9.1)	17 (14.0)	24 (19.8)	50 (41.3)	19 (15.7)	3.41	1.18
18. I will try my best to change my mind that I am a burden to my family.	25 (20.7)	40 (33.1)	26 (21.5)	26 (21.5)	4 (3.3)	2.54	1.14

Table 6 (Continued)

N (%) \ Item	Never 1	Very Few 2	Sometimes 3	Often 4	Always 5	*M*	*SD*
20. I will regulate my emotions (such as pessimism, depression, anxiety, fear, etc.) through exercise.	24 (19.8)	51 (42.1)	28 (23.1)	17 (14.0)	1 (0.8)	2.34	0.98
25. I will try to look on the bright side of things when I get into some trouble things.	2 (1.7)	26 (21.5)	58 (47.9)	26 (21.5)	9 (7.4)	3.12	0.87
33. I will talk to the medical staff about things that are uneasy and annoying.	101 (83.5)	15 (12.4)	2 (1.7)	3 (2.5)	0 (0)	1.23	0.60
34. I will try to look on the bright side of life.	2 (1.7)	16 (13.2)	54 (44.6)	40 (33.1)	9 (7.4)	3.31	0.86
35. When I'm in a bad mood, I turn my attention to other things I want to do.	15 (12.4)	40 (33.1)	40 (33.1)	20 (16.5)	6 (5.0)	2.69	1.05
36. I will exchange psychological feelings with other similar patients.	74 (61.2)	35 (28.9)	6 (5.0)	6 (5.0)	0 (0.0)	1.54	0.81
37. I always tell myself to be optimistic.	7 (5.8)	14 (11.6)	51 (42.1)	36 (29.8)	13 (10.7)	3.28	1.00
38. I will control myself from losing my temper with others.	16 (13.2)	31 (25.6)	43 (35.5)	26 (21.5)	5 (4.1)	2.78	1.06
39. If there are troubles, I will confide in my relatives and friends.	19 (15.7)	62 (51.2)	30 (24.8)	10 (8.3)	0 (0.0)	2.26	0.82
40. When I am in a bad mood, I will ask my friends or family for comfort and help.	17 (14.0)	59 (48.8)	32 (26.4)	13 (10.7)	0 (0.0)	2.33	0.85

Table 6 (Continued)

N (%) Item	Never 1	Very Few 2	Sometimes 3	Often 4	Always 5	M	SD
Information management							
7. I will exchange disease knowledge with other patients with COPD.	57 (47.1)	38 (31.4)	24 (19.8)	2 (1.7)	0 (0.0)	1.76	0.83
8. I will surf the Internet or consult professional medical books for relevant information.	92 (76.0)	12 (9.9)	13 (10.7)	3 (2.5)	1 (0.8)	1.42	0.85
9. I will often read the newspaper to learn about disease-related information.	109 (90.1)	4 (3.3)	7 (5.8)	0 (0.0)	1 (0.8)	1.18	0.61
10. I will keep the disease-related data completely (e.g., outpatient medical records, examination result).	22 (18.2)	28 (23.1)	31 (25.6)	29 (24.0)	11 (9.1)	2.83	1.24
11. I will discuss with the health care staff other issues related to the disease (such as: is the disease contagious?).	17 (14.0)	46 (38.0)	39 (32.2)	17 (14.0)	2 (1.7)	2.51	0.96
21. If I don't understand the treatment, I will consult the medical staff.	21 (17.4)	37 (30.6)	47 (38.8)	11 (9.1)	5 (4.1)	2.52	1.02
22. If I don't understand the test results, I will consult the medical staff.	15 (12.4)	45 (37.2)	49 (40.5)	7 (5.8)	5 (4.1)	2.52	0.93
24. When I consult with the health care staff, I will make a list of the questions I want to ask.	106 (87.6)	12 (9.9)	3 (2.5)	0 (0.0)	0 (0.0)	1.15	0.42

Table 7 showing frequency, Percentage of each item correct answer of COPD

knowledge questionnaire (n = 121)

Item	Correct answer	Percentage correct (%)	Rank
1.People with COPD should get a pneumonia vaccine injection.	39	32.2	8
2. Inhaling oxygen at home can help a patient with COPD live longer.	65	53.7	4
3. COPD drugs prevent progression of the disease.	34	28.1	9
4. COPD can be prevented.	65	53.7	5
5. When COPD symptoms improve, a patient can stop treatment with a long-term respiratory drug (inhaler).	31	25.6	12
6. People with COPD frequently have a lingering cough.	78	64.5	2
7. Quitting smoking will prevent COPD from worsening.	28	23.1	13
8. Cigarette smoking or second-hand smoke causes most COPD.	52	43.0	6
9. COPD patients may experience shortness of breath.	85	70.2	1
10. The drug albuterol (inhaler) can be used any time you have shortness of breath.	31	25.6	12
11. A COPD patient should have an annual flu vaccine injection.	44	36.4	7
12. People should only use their COPD inhaler (drug) when they can't breathe.	33	27.3	10
13. COPD can be reversed.	75	62.0	3

APPENDIX C

Permission letters to use instruments

Permission letter to use the COPD Self-Management Scale (CSMS)

The original version:

From "rainy"<404669792@qq.com>;

04/3/2021 4:51 PM

To Xiaowen Sheng

Subject: CSMS

同意！

张彩虹

The Modified version:

From Yang Hua yanghua1800@163.com

04/22/2021 07:27 PM

To Xiaowen Sheng

Subject: CSMS

盛晓雯您好！同意授权。标注出处即可。谢谢！

祝顺利！

杨华

Permission letter to use the COPD Knowledge Questionnaire (COPD-Q)

The original version:

From <afranks@uthsc.edu>

12/28/2020 10:14 PM

To Xiaowen Sheng

Subject: COPD-Q

Dear Xiaowen,

I would be honored for you to use our instrument. Please cite our article as a reference in your thesis, and any subsequent publications.

I am attaching some documents that you may find useful, including the COPD-Q that a researcher in China translated.

Best wishes for a successful thesis!

Sincerely,

Andrea Franks

Stewart

Andrea S. Franks, Pharm.D., BCPS

Professor and Vice Chair, Department of Clinical Pharmacy and Translational Science

Permission letter to use the Self-efficacy for Managing Chronic Disease 6-item Scale

The original version:

From Kate R Lorig <lorig@stanford.edu>;

04/20/2021 10:12 PM

To Xiaowen Sheng

Subject: about permission of "Self-Efficacy for Managing Chronic Disease 6-item Scale"

This scale if free for everyone to use and yes you have my permission to use. Good luck with your studies

Kate R Lorig

The Chinese version:

From Fu Hua   hfu@fudan.edu.cn

Sat 12/19/2020 17:16 PM

To Xiaowen Sheng

Subject: The Chinese version of Self-Efficacy for Managing Chronic Disease 6-item Scale"

可以使用

Regards

Fu Hua

傅华

Permission letter to use the perceived social support scale (PSSS)

The original version:

From <gzimet@iu.edu>

05/05/2021 08:36 AM

Subject: about permission of "Multidimensional Scale of Perceived Social Support (MPSS)"

Dear Xiaowen Sheng,

You have my permission to use the Multidimensional Scale of Perceived Social Support (MSPSS) in your research.   I have attached the original English language version of the scale (with scoring information on the 2nd page), a document listing several of the articles that have reported on the reliability and validity of the MSPSS, and a chapter that I wrote about the scale.

Also attached is a simplified Chinese translation of the MSPSS, which you may find helpful.

I hope your research goes well.

Best regards,

Greg Zimet

The Chinese version:

From 姜乾金 <jqj@zj.com>

01/16/2021 10:04 AM

To Xiaowen Sheng

Subject: The Chinese version of PSSS

可以

姜乾金 浙江大学 教授 主任医师

APPENDIX D

Participant information sheet and consent form

(Participant Information Sheet)

IRB approval number: ……………………………………………

Title of study: …Factors related to self-management behaviors among persons with mild to moderate chronic obstructive pulmonary disease in Wenzhou, China

Dear participants

      I am Ms. Xiaowen Sheng, a postgraduate student at Faculty of Nursing, Burapha University Thailand. My study is "Factors related to self-management behaviors among persons with mild to moderate chronic obstructive pulmonary disease in Wenzhou, China". The research objectives are to describe the self-management behavior and examine related factors of self-management behaviors among persons with mild to moderate COPD who come to receive health services related to COPD care at respiratory outpation department (OPD) of The First Affiliated Hospital of Wenzhou Medical University in Wenzhou, China.

      This study will be a survey study. Participating in this study is voluntary. If you agree to participate in this study, you will answer the following questionnaires, which will take approximately 20-30 minutes. During the data collection, period, the researcher will clarify any question posed by the participants for clarity regarding the language or content. You will not get any direct benefits by participating in this study. However, the information collected from this study may be valuable in developing care models and interventions which can help the health care workers and hospital and the health care workers to provide advanced and better care for mild to moderate COPD persons. There will be no identified physical and psychological risk to the person participating in the study and no risk to the society.

You have the right to end your participation in this study at any time, and no necessary to inform the researcher, and it will not affect the quality of services you receive from the respiratory OPD. Any information collected from this study, including your identity, will be kept confidential. A coding number will be assigned to you and your name will not be used. Findings from the study will be presented as a group of participants and no specific information from any individual participant will be disclosed. All data will be accessible only to the researcher which will be destroyed one year after publishing the findings. You will receive a further explanation of the nature of the study upon its completion if you wish.

The research will be conducted by Ms. Xiaowen Sheng under the supervision of my major-advisor, Associate Professor Dr. Niphawan Samartkit. If you have any questions, please contact me at mobile number: + 8618857904080 or by my e-mail: sxwholly@163.com, and/or my advisor's e-mail address nsamartkit@gmail.com, or you may contact Burapha University Institutional Review Board (BUU-IRB) email address buuethics@buu.ac.th, and/or telephone number: +66-38-10-2620. Your cooperation is greatly appreciated. You will be given a copy of this consent form to keep.

Xiaowen Sheng

เอกสารแสดงความยินยอม

ของผู้เข้าร่วมโครงการวิจัย (Consent Form)

IRB number: ………………………………………………………………………

Title of the study: Factors related to self-management behaviors among persons with mild to moderate chronic obstructive pulmonary disease in Wenzhou, China".

Date of data collection ……......………Month…......………Year ……………….

      Before giving my signature below, I have been informed by researcher, Ms. Xiaowen Sheng about the purposes, method, procedures, benefits and possible risks associated with participation in this study thoroughly, and I understood all of the explanations. I consent voluntarily to participate in this study. I understand that I have the right to leave the study any time I want, without fearing that it might affect the quality of health care services that I will receive from the hospital and respiratory OPD hereafter.

      The researcher Ms. Xiaowen Sheng has explained to me that all data and information of the participants will be kept confidential and only be used for this study. I have read and understood the information related to participation in this study clearly and I am signing this consent form.

Signature

(…………………………………………….…)

Participant

(…………………………………………….…)

APPENDIX E

Ethical approval letter and data collection letter

สำเนา

เอกสารรับรองผลการพิจารณาจริยธรรมการวิจัยในมนุษย์
มหาวิทยาลัยบูรพา

คณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์ มหาวิทยาลัยบูรพา ได้พิจารณาโครงการวิจัย

รหัสโครงการวิจัย : G-HS041/2564

โครงการวิจัยเรื่อง : Factors related to self-management behaviors among persons with mild to moderate chronic obstructive pulmonary disease in Wenzhou, China.

หัวหน้าโครงการวิจัย : MRS.XIAOWEN SHENG

หน่วยงานที่สังกัด : คณะพยาบาลศาสตร์

BUU Ethics Committee for Human Research has considered the following research protocol according to the ethical principles of human research in which the researchers respect human's right and honor, do not violate right and safety, and do no harms to the research participants.

Therefore, the research protocol is approved (See attached)

1. Form of Human Research Protocol Submission Version 2 : 23 June 2021
2. Research Protocol Version 1 : 20 May 2021
3. Participant Information Sheet Version 2 : 23 June 2021
4. Informed Consent Form Version 1 : 20 May 2021
5. Research Instruments Version 1 : 20 May 2021
6. Others (if any) Version - : -

วันที่รับรอง : วันที่ 10 เดือน กรกฎาคม พ.ศ. 2564
วันที่หมดอายุ : วันที่ 10 เดือน กรกฎาคม พ.ศ. 2565

ลงนาม *นางสาวรมร แย้มประทุม*
(นางสาวรมร แย้มประทุม)
ประธานคณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์ มหาวิทยาลัยบูรพา
ชุดที่ 3 (กลุ่มคลินิก/ วิทยาศาสตร์สุขภาพ/ วิทยาศาสตร์และเทคโนโลยี)

温州医科大学附属第一医院　　　　　　　　　　版本日期：2021.4.29v1.1 版

温州医科大学附属第一医院临床研究立项批件

项目名称	温州地区轻度到中度慢性阻塞性肺疾病人群自我管理行为的相关因素研究	院内编号	2021-zz-074
项目来源	研究者发起	经费（万）	0 万
研究类型	□回顾性 ☑前瞻性/☑观察性 □干预性	研究目的	□文章发表 □纵向课题 ☑自主研究 □合作课题
负责人	李海燕	科室	泌尿外科
合作单位	☑否　　□是，合作单位名称＿＿＿＿＿		
审查材料	医学临床科研项目及伦理审查申请表，v1.0 版； 伦理批件 2021-095； 临床研究方案，v1.0 版，2021.03.31； 受试者知情同意书，v1.0 版，2021.03.31； 研究者团队成员目录（职责）； 主要研究者、团队成员简历及 GCP 证书，v1.0 版； 研究者责任声明； CRF/临床观察表样板，v1.0 版。		
审查意见	同意项目开展		
临床研究管理委员会主任		审核日期	2021.5.26

备注：
1、临床研究科研项目的合同签订参照《温州医科大学附属第一医院临床研究项目管理办法（试行）》，具体经费使用参照《温州医科大学附属第一医院临床研究项目管理办法（试行）》和合同约定执行。
2、临床研究科研项目应按照合同/任务书约定按时完成研究计划，项目完成后，须提交项目完成报告给临床研究管理部门。

MHESI 8137/ 1495

Graduate School, Burapha University
169 Longhaad Bangsaen Rd.
Saensuk, Muang, Chonburi
Thailand, 20131

July 20th, 2021

Dear   President of The First Affiliated Hospital of Wenzhou Medical University,

Enclosure: 1. Certificate ethics document of Burapha University
            2. Research Instruments (Try out)

On behalf of the Graduate School, Burapha University, I would like to request permission for Mrs. XIAOWEN SHENG to collect data for conducting research.

Mrs. XIAOWEN SHENG ID 62910078, a graduate student of the Master of Nursing Science program, major in Adult Nursing Pathway, Faculty of Nursing, Thailand, was approved her thesis proposal entitled: "Factors Related to Self-Management Behaviors Among Persons with Mild to Moderate Chronic Obstructive Pulmonary Diseases in Wenzhou, China" under supervision of Assoc. Prof. Dr. Niphawan Samartkit as the principle advisor. She proposes to collect data from 30 persons with mild to moderate chronic obstructive pulmonary disease in The Respiratory Outpatient Department, The First Affiliated Hospital of Wenzhou Medical University.

The data collection will be carried out from July 25th, 2021 - August 10th, 2021. In this regard, you can contact Mrs. XIAOWEN SHENG via mobile phone +86-1885-7904-080 or E-mail: sxwholly@163.com

Please do not hesitate to contact me if you need further relevant queries.

Sincerely yours,

(Assoc. Prof. Dr. Nujjaree Chaimongkol)
Dean of Graduate School, Burapha University

Graduate School Office
Tel: +66 3810 2700 ext. 701, 705, 707
E-mail: grd.buu@go.buu.ac.th
http://grd.buu.ac.th

BIOGRAPHY

NAME   Xiaowen Sheng

DATE OF BIRTH   17 May 1992

PLACE OF BIRTH   JinHua, ZheJiang, China

PRESENT ADDRESS   No.26, Yarao Village, BaiLongqiao Town, Jinhua,
                            Zhejiang, China

POSITION HELD   Student

EDUCATION   2011-2015 Bachelor of Nursing (B.S.N), Wenzhou
                            Medical University, Wenzhou, China
                            2019-2021 Master of Nursing Science (International
                            Program)(M.N.S), Faculty of Nursing, Burapha
                            University, Chonburi, Thailand