


# Barriers and Facilitators to Exercise Compliance for Community Elders with COPD: A Cross-Sectional Study

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**Background and Aim:** Exercise compliance was known as important to improve long-term health conditions for Chronic obstructive pulmonary disease (COPD) patients, however, little was known about the determinants which affect their exercise compliance. This study aimed to investigate factors related to exercise compliance of COPD elderly patients.

**Methods:** This cross-sectional study included elderly patients with stable COPD participants. Random cluster sampling and a survey, including the Exercise Compliance Scale, mMRC Dyspnea Index Scale, Social Support Scale, Anxiety Self-Assessment Scale, and Self-rating Depression Scale, were used. Data were analyzed using Spearman correlation and backward logistic regression.

**Results:** 124 participants (45.90%) had poor exercise compliance while 146 had good compliance (54.10%). The backward logistic regression showed household monthly income (¥501–¥1500: OR=21.54,  $P<0.05$ ; ¥3001–¥5000: OR=32.76,  $P<0.05$ ), two chronic comorbidities (OR=17.13,  $P<0.05$ ), and the moderate dyspnea (OR=16.87,  $P<0.05$ ) might help to improve exercise compliance. While female COPD patients (OR=0.11,  $P<0.01$ ) who had server dyspnea (OR=0.02,  $P<0.05$ ) and depression (OR=0.84,  $P<0.05$ ) might have more difficulties adhering to exercise.

**Conclusion:** Low exercise compliance in community-dwelling elderly COPD patients could be affected by sex, monthly income level, number of chronic comorbidities, dyspnea, and depression.

**Keywords:** chronic obstructive pulmonary disease, exercise compliance, elderly, community

## Introduction

Chronic obstructive pulmonary disease (COPD) is characterized by chronic cough, expectoration, chest tightness, shortness of breath, and dyspnea, with clinical features such as slow progression, a long course, severe illness, and great harm.<sup>1,2</sup> According to the 2020 Global Strategy for Prevention, Diagnosis, and Management of COPD,<sup>3</sup> among people over the age of 40 in the world, the estimated prevalence of COPD is 5–16% while people over 60 years of age might exceed 27%. More than 5.4 million people are predicted to die from COPD and related diseases by 2060. In 2018, results of the “Chinese Adult Lung Health Study” showed that prevalence of COPD in adults aged 20 years or above in China was 8.6%, and those aged more than 40 years were as high as 13.7%. The number of COPD patients in China is estimated to be nearly 100 million.<sup>4</sup>

Currently, COPD prevention and treatment guidelines for countries around the world suggest exercise as a rehabilitation method for non-drug treatment of COPD.<sup>5</sup> Exercise can not only effectively improve patients' symptoms, such as dyspnea,<sup>6</sup> but also improve exercise tolerance, daily activities, pulmonary function, and quality of life.<sup>7–10</sup> The incidence of re-exacerbations, readmission, and mortality would then be lowered in COPD patients over a lengthy period of time.<sup>11–13</sup> Public health guidelines recommend that patients with chronic diseases should maintain moderate-to-vigorous physical activity for more than 5 days a week, at least 30 min per day (total  $\geq 150$  min/week).<sup>14</sup> However, even

though most patients know having regular exercise would improve their long-term body function, a low level of exercise compliance is still a major concern for COPD patients who are sedentary and have low intrinsic motivation to exercise.<sup>15</sup> Studies have shown that patients' cognition of exercise and physical and psychological problems such as fatigue, mobility impairment, breathing problems, depression, and disappointment could create barriers to COPD patients for their exercise compliance.<sup>16</sup>

At present, research on the exercise of COPD patients with COPD in China is limited, and rehabilitation exercises are mainly suitable for patients who stay in hospitals. Exercise compliance and its influencing factors in community-dwelling elderly patients with stable COPD are currently unknown. Therefore, this study aimed to develop a cross-sectional survey to examine exercise compliance of stable COPD patients in several communities in Haikou.

## Methods

This cross-sectional study was conducted in Haikou, the capital city with the most diverse population in Hainan Province, between April and July 2021.

### Sampling and Participants

Random cluster sampling was used in this study. The sample size was calculated based on the Equation  $N=4U_{\alpha}^2S^2/\delta^2$ , and  $U_{\alpha}=1.96$ ,  $\delta$  was set as  $0.25S$ ,<sup>17</sup> so  $N = 246$ , and considered there might be a 10% loss rate, so we finally decide the size could be 271.

According to the 10% prevalence of COPD patients aged > 60 in China<sup>18</sup> and the number of permanent residents in Haikou (2,873,358), the number of COPD patients in Haikou City was approximately 287,335. Haikou has 211 districts, and each district has approximately 1361 COPD patients.

The research team randomly encoded all districts into a random number table, then selected one district and included all COPD patients who satisfied the inclusion criteria for this study: ① aged  $\geq 60$ ; ② consistent with the COPD diagnosis guideline made by the Chinese Medical Association (2021);<sup>19</sup> ③ had at least three months of GOLD pulmonary rehabilitation training;<sup>20</sup> ④ able to understand the content of the questionnaire. Participants were excluded if they had ① other serious diseases and were unable to cooperate; ② mental illness or inability to express thoughts; ③ no exercise due to trauma or other reasons. If recruitment in this district failed to reach 271 participants, another random selection was conducted until the sample size was reached. Finally, we selected three districts.

### Questionnaire and Scales

The demographic questionnaire was designed to investigate age, sex, marital status, lifestyle, occupation before retirement, education level, monthly household income, chronic comorbidity, COPD history, hospital stays, exercise training, and smoking status.

The exercise compliance questionnaire was designed based on the existing exercise compliance surveys,<sup>21–23</sup> which had three dimensions and 17 questions. The three dimensions were physical activity (8 items), effect supervision (3 items), and advice-seeking (6 items). Each question applied a 4-Point Likert Scale ranging from “I can't do it at all”, “occasionally I can do it”, “basically I can do it”, to “I can do it completely.” The total score of the questionnaire was 68. The compliance index was calculated based on the compliance score and the compliance index (compliance score/68)  $\times 100$ . compliance scores greater than 75 were identified as high compliance, 50–75 was moderate, and low.<sup>22</sup> The questionnaire was pilot tested and reviewed by five professionals (three respiratory experts, one statistician, and one rehabilitation training expert). Cronbach's  $\alpha$  was 0.83, and the content validity was 0.92.

The Modified Medical Research Council (mMRC) Dyspnea Scale<sup>24</sup> divides COPD dyspnea into five levels. Grade 0: no dyspnea except vigorous workout; Grade I: Difficulty in breathing when moving quickly or climbing a hill; Grade II: walking slower than peers due to dyspnea or need to stop due to dyspnea when walking at own pace; Grade III: need to stop breathing after walking approximately 100 m or a few minutes; Grade IV: Difficulty in breathing when leaving the room or dressing and undressing. mMRC grade 0, mild dyspnea; grade 1, moderate while grade 2–4, severe dyspnea.

Social Support Rating Scale (SSRS) employed one made by Xiao et al<sup>25</sup> The scale consists of three dimensions: objective support (3 items), subjective support (4 items), and utilization of social support (3 items). The total SRSS score

was the sum of the scores of the 10 items. A higher score indicated higher social support received, with an overall score of 66 points. 45–66 points were deemed a high level of social support, while 23–44 points are considered medium, and less than 22 points are considered low. The retest credibility of the scale was 0.92, and the consistency coefficient of each item is between 0.89–0.95.

Self-rating anxiety scale (SAS) and Self-Rating Depression Scale (SDS)<sup>26</sup> were used. Both scales were filled according to the frequency of symptoms showing in each item and applied Likert 4-point system. The calculation is based on one to four points for the negative description, while the positive is calculated in reverse order. The sum of the scores of the 20 items multiplied by 1.25 was the standard score of each participant. A SAS score greater than 50 was considered anxiety, while 50–59 was mild, 60–69 was moderate, and 70 was severe. An SDS score larger than 53 indicated depression, while 23–62 indicated mild, 63–72 indicated moderate depression, and > 73 indicated severe depression.

## Data Collection

Contact information of COPD patients with COPD was obtained from the health records of three randomly selected communities. The research team explained the purpose, meaning, and requirements of this study to the participants and their families through phone calls. After obtaining consent, patients with COPD in the stable stage who met the inclusion criteria were investigated anonymously. The questionnaires were distributed and collected individually. Participants were requested to complete the questionnaire independently. All the questionnaires were screened for missing values when they were returned to the research team.

## Data Analysis

SPSS26.0 statistical software was used to analyse the data obtained. Demographic data are presented as  $X \pm s$  and percentages (%). The *t*-test and chi-square test were used to test the differences between groups. Spearman's rank correlation analysis was used to investigate the strength and direction of the association between variables. Backward logistic regression analysis was performed to investigate determinants of exercise compliance. Statistical significance was set at  $P \leq 0.05$ .

## Validity, Reliability and Rigor

All investigators were members of the research team. Training on the research purpose, questionnaire content, and data collection methods was conducted for all investigators prior to collection. Each participant was coded before analysis. Two researchers double-checked all questionnaires while inputting all data into the software to ensure accuracy. Data cleaning was done by two researchers together. The questionnaire was deleted if its missing values were more than 10%. Less than 10% would use mean to replace the missing item.

## Ethical Consideration

This study was conducted in accordance with the Principles of the Declaration of Helsinki and was reviewed and approved by Hainan Medical University (LLXJSHL002).

## Results

### Social Demographic of the Respondents

In total, 270 questionnaires were finally distributed, and the effective response rate of 99.6%. The participants were predominantly male ( $n=164$ , 60.7%), of elder age ( $68.6 \pm 5.3$  years), married ( $n=197$ , 73%), and currently non-smoking ( $n=141$ , 52.2%). Most lived with spouses ( $n=177$ , 66.5%), 47 cases (17.4%) lived alone, and nearly a quarter lived with children or grandchildren. Nearly half of respondents had primary school education ( $n=128$ , 47.4%), while the rest stopped at middle school ( $n=96$ , 35.6%) and high school ( $n=46$ , 17%). Occupation of the Participants before retiring were mainly farmers ( $n=111$ , 41.1%) and workers ( $n=88$ , 32.6%). For the monthly household income, over 70% could have ¥1501–5000 per month (a currency exchange rate of US \$1=¥6.5 at then), while close to 10% of them less than ¥500.

Most COPD participants have a chronic comorbidity (n=183, 67.8%), while 70 patients had two (n=70, 25.9%). 36.9% had been admitted to the hospital 1–2 times previously, and 47% had 3–4 times. Close to 70% of patients have more than five years of COPD history. In terms of exercise training, only 9.3% preferred to attend hospital and community exercise training, while the rest four exercise training had similar number of participants (Table 1).

## Exercise Compliance, mMRC Dyspnea, SAS, SDS, and Social Support

The overall score of the exercise compliance questionnaire of 270 patients was 54.1±6.5. In its three dimensions, the physical activity score was 26.9±3.9, effect supervision 9.6±1.9, and advice seeking 17.7±1.1 (Table 2). In total, 124 participants (45.90%) had poor compliance and 146 had good compliance (54.10%). Regarding the mMRC dyspnea score, moderate or severe dyspnea was 108 cases (40%) and 105 cases (38.9%) respectively. The social support score of

**Table 1** The Exercise Compliance Score Across Social Demographic Variables (n=270)

Variables		Exercise Compliance Score (n, %)		$\chi^2$ /t-test	P
		Poor Compliance (n=124, 45.9%)	Good Compliance (n=146, 54.1%)		
<b>Age</b>		68.1±5.1	69.1±5.5	1.6	0.111
<b>Gender</b>	<b>Male</b>	40 (14.8%)	124 (45.9%)	78.01	<0.001
	<b>Female</b>	84 (31.1%)	22 (8.2%)		
<b>Married</b>	<b>Married</b>	118 (43.7%)	79 (29.3%)	57.28	<0.001
	<b>Widowed</b>	6 (2.2%)	67 (24.8%)		
<b>Live style</b>	<b>Live alone</b>	14 (5.2%)	33 (12.2%)	34.58	<0.001
	<b>Live with spouse</b>	92 (34.1%)	85 (31.5%)		
	<b>Live with children</b>	15 (5.6%)	2 (0.7%)		
	<b>Live with children or grandchildren</b>	3 (1.1%)	26 (9.6%)		
<b>Educational level</b>	<b>None or primary school</b>	64 (23.7%)	64 (23.7%)	1.89	0.388
	<b>Middle school</b>	42 (15.6%)	54 (20%)		
	<b>High school</b>	18 (6.7%)	28 (10.4%)		
<b>Occupation before retirement</b>	<b>Worker</b>	30 (11.1%)	58 (21.5%)	19.91	<0.001
	<b>Farmer</b>	65 (24.1%)	46 (17%)		
	<b>Self-employed</b>	16 (5.9%)	10 (3.7%)		
	<b>Employee of government or institution</b>	13 (4.8%)	32 (11.9%)		
<b>Monthly household income</b>	<b>¥ ≤500</b>	24 (8.9%)	2 (0.7%)	82.37	<0.001
	<b>¥ 501–1500</b>	31 (11.5%)	23 (8.5%)		
	<b>¥ 1501–3000</b>	55 (20.4%)	30 (11.1%)		
	<b>¥ 3001–5000</b>	14 (5.2%)	91 (33.7%)		
<b>Chronic comorbidity</b>	<b>1</b>	121 (44.8%)	62 (23%)	93.36	<0.001
	<b>2</b>	3 (1.1%)	67 (24.8%)		
	<b>3</b>	0	17 (6.3%)		
<b>COPD history</b>	<b>&lt;5 years</b>	55 (20.4%)	24 (8.9%)	54.22	<0.001
	<b>5–10 years</b>	67 (24.8%)	78 (28.9%)		
	<b>10–15 years</b>	2 (0.7%)	4 (1.5%)		
	<b>&gt;15 years</b>	0	40 (14.8%)		
<b>Smoking status</b>	<b>No</b>	68 (25.2%)	73 (27%)	0.63	<0.001
	<b>Yes</b>	56 (20.7%)	73 (27%)		
<b>Hospital stays</b>	<b>1–2</b>	52 (19.3%)	45 (16.7%)	34.68	<0.001
	<b>3–4</b>	69 (25.6%)	58 (21.5%)		
	<b>&gt;5</b>	3 (1.1%)	43 (15.9%)		

(Continued)

Table 1 (Continued).

Variables		Exercise Compliance Score (n, %)		$\chi^2$ /t-test	P
		Poor Compliance (n=124, 45.9%)	Good Compliance (n=146, 54.1%)		
Exercise training	Home-online	55 (20.4%)	10 (3.7%)	154.25	<0.001
	Hospital-offline	56 (20.7%)	12 (4.4%)		
	Home-online plus hospital-offline	9 (3.3%)	44 (16.3%)		
	Hospital-offline plus home-offline	1 (0.4%)	24 (8.9%)		
	Home-offline	3 (1.1%)	56 (20.7%)		
mMRC dyspnea score	Mild	19 (7%)	38 (14%)	211.02	<0.001
	Moderate	1 (0.4%)	107 (39.6%)		
	Severe	104 (38.5%)	1 (0.4%)		
SSRS score		35.10±8.13	37.85±8.41	2.71	0.007
SAS score		37.38±3.50	42.03±2.03	13.59	<0.001
SDS score		55.04±4.50	52.01±6.14	13.05	<0.001

Table 2 Exercise Compliance, mMRC Dyspnea, SAS, SDS and Social Support

Variable	Scale Dimension	Score ( $\bar{x}\pm s$ , n=270)
Overall exercise compliance score		54.1±6.5
Dimension 1	Physical activity	26.9±3.9
Dimension 2	Effect supervision	9.6±1.9
Dimension 3	Advice seeking	17.7±1.1
Social support scale (SSRS)		36.6±8.4
Self-rating anxiety scale (SAS)		39.9±3.6
And self-rating depression scale (SDS)		68.8±5.6

the participants was 36.6±8.4. The SAS score ranged from 39.9±3.6, so no one was deemed anxious. The score of SDS was 68.8±5.6, and among them, 136 (50.4%) had mild depression cases and 10 cases (3.7%) were moderate, and 124 cases (45.9%) had no depression (Table 1).

## The Exercise Compliance Score Across Social Demographic Variables

Table 1 shows that there was a statistically significant difference between poor and good exercise compliance according to sex, marital status, lifestyle, occupation before retirement, household monthly income, chronic comorbidity, COPD history, hospital stay, exercise training, mMRC dyspnea score, SSRS score, SAS score, and SDS score ( $P<0.001$ ). There was no significant difference between the two exercise compliance levels at different ages, education levels, or smoking statuses ( $P>0.05$ ).

## The Correlation Between Exercise Compliance and Social Demographic Variables

Spearman correlation analysis showed that exercise compliance was correlated with some demographic factors, such as sex, marital status, household monthly income, chronic comorbidity, COPD history, hospital stay, exercise training, mMRC dyspnea score, SSRS score, SAS score, and SDS score ( $P<0.001$ ), but not with lifestyle or occupation before retirement ( $P>0.05$ ) (Table 3).

**Table 3** Correlation Analysis Between Exercise Compliance and Basic Data in Elderly Patients with Stable COPD (N=270)

Variables	The Total Score of Exercise Compliance		Variables	The Total Score of Exercise Compliance	
	$\gamma$	P		$\gamma$	P
Gender	-0.540	<0.001	COPD history	0.418	<0.001
Marital status	0.461	<0.001	Hospital stays	0.249	<0.001
Live style	-0.035	0.568	mMRC dyspnea score	-0.670	<0.001
Occupation before retirement	-0.091	0.137	SSRS score	0.183	0.002
Household monthly income	0.503	<0.001	SAS score	-0.379	<0.001
Chronic comorbidity	0.584	<0.001	SDS score	-0.561	<0.001
Exercise training	0.691	<0.001			

**Table 4** Logistic Regression Analysis of Exercise Compliance (N=270)

Predictors	Variables	B	Standard Error	Wald Chi-Square	OR	P
Gender	Male*					
	Female	-2.25	0.81	7.83	0.11	0.01
Household monthly income	¥ ≤500*					
	¥ 501–1500	3.07	1.46	4.41	21.54	0.04
	¥ 1501–3000	1.12	1.4	0.63	3.06	0.43
	¥ 3001–5000	3.49	1.58	4.87	32.76	0.03
Chronic comorbidity	1*					
	2	2.84	1.22	5.41	17.13	0.02
	3	1.11	2.25	0.24	3.04	0.62
mMRC dyspnea score	Mild*					
	Moderate	2.84	1.174	5.78	16.87	0.02
	Severe	-3.99	1.18	11.4	0.02	0.001
SDS score		-0.17	0.06	9.89	0.84	0.002
Constant		9.85	3.09	10.14	18,985.42	0.001

Note: \*Mean reference group.

## Facilitators and Barriers to Exercise Compliance

The backward logistic regression analysis results showed that compared with males, elderly women with COPD had lower exercise compliance (OR=0.11,  $P<0.01$ ). Participants who had family income ¥501 to ¥1500 (OR=21.54,  $P<0.05$ ) had lower exercise compliance than those who had ¥3001–¥5000 (OR=32.76,  $P<0.05$ ) per month. Compared to participants with one chronic comorbidity, those with two comorbidities (OR=17.13,  $P<0.05$ ) showed more exercise compliance. Those with moderate dyspnea (OR=16.87,  $P<0.05$ ) had higher exercise compliance than those with mild breathing difficulties. As dyspnea became more severe, COPD patients were reluctant to exercise (OR=0.02,  $P<0.01$ ). Exercise compliance was poorer with higher depression scores (OR=0.84,  $P<0.01$ ) (Table 4).

## Discussion

Compliance refers to a behavior in which a patient would like to do what his or her doctor suggested and is consistent with the medical advice for a long time, which would, to a large extent, affect the effect of exercise.<sup>27</sup> At present, there is no scale of exercise compliance for patients with COPD; therefore, this study applied a self-designed exercise compliance scale, especially for community-dwelling patients. The results showed that the exercise compliance score of elderly patients with stable COPD in the community was relatively low compared with that of patients in the hospital.<sup>28</sup> 45.9% was A poor level of exercise compliance and 50.50% was good, which was not ideal compared to

other chronic patients, such as heart failure.<sup>29</sup> This may be due to COPD caused symptoms, such as dyspnea, fatigue, skeletal muscle dysfunction, and frailty, which would undermine patients' motivation to exercise.<sup>30</sup> Community health workers should pay more attention to the exercise situation of patients with COPD to ensure compliance.

Female participants in this study had lower exercise compliance than male participants, which is similar to the findings of McCarron et al.<sup>31</sup> This may be because of the maternal role in the Chinese family structure. They defaulted as housekeepers who voluntarily took responsibility for looking after others through other daily activities such as shopping, cleaning, and cooking. This may have resulted in insufficient exercise duration. Some may even treat these activities as a type of exercise that can achieve the same effect. Therefore, after discharge from the hospital, their "patient" role would be replaced by the "caregiver" role in the family atmosphere, and their motivation to adhere to exercise training became low. For community-dwelling female patients with COPD, qualitative studies exploring the reasons for low exercise adherence are needed. Research comparing daily activity consumption with current exercise training to design a more fittable program is needed to improve compliance.

Monthly Household income is another factor affecting exercise compliance, which has been substantiated by research.<sup>32,33</sup> In this study, compared with participants with a monthly income less than ¥500, elderly COPD patients with monthly incomes of ¥501–¥1500 and ¥3001–¥5000 had better exercise compliance. The reason for this might be that low-income COPD patients have a lower awareness of the benefits of exercise. Moreover, insufficient financial support limits access to hospital rehabilitation training. Exercise compliance of participants with monthly household income between ¥1500 and ¥3000 showed no significant difference compared to those with less than ¥500 family income per month. This might be because these participants mostly lived in urban villages, who might have had a better income but limited awareness and access to comprehensive hospital rehabilitation training. Community health services in these areas are often as undeveloped as those in the villages. Therefore, urban villages should be considered when planning for community rehabilitation services.

The mMRC dyspnea index score reflects the breathing difficulty of COPD patients, and the patient's lung function during exercise directly affects their comfort. In this study, patients with moderate dyspnea showed higher exercise compliance; however, severe dyspnea impeded compliance. Patients with two types of chronic comorbidities had better exercise compliance; however, patients with three comorbidities showed no differences. To some extent, this meant that when the patient realized a serious condition, they adhered to exercise to improve their body function. However, severe dyspnea and multiple comorbidities would block their activities. This was in accordance with many studies<sup>34–36</sup> which showed that patients with higher dyspnea scores had poorer adherence to pulmonary rehabilitation. Therefore, before exercise training, the patient's respiratory function and comorbidities should be comprehensively evaluated, and medication management and home oxygen therapy should be provided to create an individualized exercise plan for each patient.

The participants showed no anxiety, while 54.10% of them were depressed, of which mild depression accounted for 50.40% had moderate depression 3.70%. Studies have also reported a high incidence of anxiety and depression in patients with COPD.<sup>37,38</sup> Owing to the long disease course and progressive aggravation, patients with COPD face various pressures. In addition, chronic cerebral hypoxia caused by the disease and brain cell degeneration induced by medications can lead to anxiety and depression.<sup>39</sup> The regression analysis results of this study were consistent with the findings of Pierobon et al,<sup>40</sup> who showed that anxiety and depression were independent predictors of pulmonary rehabilitation compliance, and that a higher degree of depression would lead to lower patient compliance. The cure rate for depression in COPD patients was only 30%.<sup>41</sup> Mental stress in COPD patients is common but has long been neglected in clinical practice. Further research on improving exercise compliance is needed to include psychologists to continuously assess patients' mental states and to implement early interventions.

Currently, COPD exercise rehabilitation programs are designed using a combination of home- or hospital-based online and offline interventions. Offline hospital exercise training was mainly conducted during the patient's hospital stay, under the supervision of health professionals. Most offline home training was organized before discharge through pre-training, delivering home-based rehabilitation booklets, watching videos, and follow-up phone calls after discharge. Some programs would also design home online training or integration of the two types, and many studies have found the significance of COPD exercise outcomes through online and offline exercise training.<sup>42–44</sup> In this study, most participants

attended hospital-offline training, but most showed good compliance with home-offline training organized by community health services. This might be because home-offline training was near and easy to access, and was more suited for elderly patients (> 60 years of age in this study) who preferred face-to-face interactions. Participants had low engagement in hospital-offline exercise, but relatively higher compliance with programs that integrated home-online and hospital-offline exercise training. This might be due to the long commute time and cost, as well as their poorer physical condition, which made offline hospital training more difficult after discharge. However, with the polarization of information technology among elderly people in China during COVID-19, participants who had been educated in the hospital before discharge might be more interested in following home-online exercise training.

## Limitation

This study has some limitations. For example, it merely investigated exercise compliance in elderly COPD patients in Haikou City. It is suggested that COPD patients of different age groups and regions should be more comprehensively investigated in future research. In addition, due to the research design, details of the current exercise training program (such as intervention time, setting, and methods) were missed in the questionnaire design. Further large-scale investigations could categorize the current COPD exercise training in China to systematically and pragmatically evaluate the compliance of patients to each type of exercise.

## Conclusion

The exercise compliance of community-dwelling elderly COPD patients was not ideal, and sex, monthly income level, number of chronic comorbidities, dyspnea, and depression could have an impact on it. Attention should be paid more to the screening and intervention of high-risk groups in both hospital and community-level healthcare settings.

## Ethics Statement

This study was conducted based on Principles of Declaration of Helsinki and has been ethically reviewed and approved by Hainan Medical University (LLXJSHL002).

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## Disclosure

The authors report no conflicts of interest in this work.

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