Emotional Intelligence: A Novel Outcome Associated with Wellbeing and Self-Management in Chronic Obstructive Pulmonary Disease

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Abstract

Rationale: Individuals with chronic obstructive pulmonary disease (COPD) often struggle with diminished autonomy and quality of life. Emotional factors play a crucial role in the well-being of patients with COPD; they are independently associated with critical outcomes such as dyspnea, quality of life, and health care use. Emotional intelligence is the capacity to understand and manage personal thoughts and feelings, as well as to positively influence interpersonal communication and social well-being. Emotional intelligence is a trainable skill that is extensively used in corporate business to improve well-being and performance, and it may also be significant in the self-management of emotions in patients with chronic disease. Importantly, research supports the proposition that emotional intelligence may be developed and learned at any time or any age, and training programs have been associated with increased well-being and better emotional regulation in patients with chronic disease. However, to date, no research has been done to investigate its value in patients with COPD.

Objectives: We aimed to investigate the association between emotional intelligence and two meaningful outcomes in COPD: quality of life and self-management abilities.

Methods: Participants with moderate to severe COPD completed a disease-specific quality of life tool (Chronic Respiratory Questionnaire), the Trait Emotional Intelligence Questionnaire, the Self-Management Abilities Scale, the modified Medical Research Council Dyspnea Scale, and pulmonary function tests, and also provided information about living conditions and self-reported health care use.

Measurements and Main Results: A total of 310 patients with COPD (mean age, 69 $\pm$ 9 yr; 40% female; mean FEV_1%, 42.4 $\pm$ 15.8) participated in the study. Emotional intelligence was significantly and independently associated with self-management abilities ($P < 0.0001$) and all domains of quality of life assessed (dyspnea, fatigue, emotions, and mastery; $P < 0.0001$) after adjusting for age, degree of bronchial obstruction, breathlessness, and other significant confounders.

Conclusions: Emotional intelligence may represent an important attribute in COPD, as it is associated with self-management abilities and all domains of quality of life, regardless of age or disease severity. Emotional intelligence can be learned and may complement existing rehabilitation efforts. Attention to it may address the current gap that exists in the treatment of emotional components of COPD responsible for decreased quality of life and increased health care use.

Keywords: chronic obstructive pulmonary disease; emotional intelligence; emotions; quality of life; self-management

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Adaptation to living with chronic obstructive pulmonary disease (COPD) often triggers negative emotions. In patients with COPD, emotions are particularly relevant, as more than one-third of these individuals experience negative emotions, such as depressive symptoms, fear of breathlessness, and anxiety, that are associated with poor outcomes (1). Moreover, negative thinking, such as feelings of blame and guilt, can play a role in the experience of COPD-related

symptoms (2) and contribute to impaired psychological functioning (3) and decreased treatment adherence (4).

Dealing with COPD requires constant adjustment in patient self-management to maintain quality of life and to cope with further impairment. Self-management support, a recognized component of the Chronic Care Model (5), has received increasing attention in the field of COPD due to its impact on important outcomes (6–9). The goal of self-management support is to impact behavior by increasing patients' self-efficacy and knowledge (10) with the goals of improved functioning and quality of life. Initially, COPD self-management was associated with the use of written action plans addressing the early signs of COPD exacerbations (7, 11). However, self-management goes far beyond the prescription of action plans for exacerbations, and emotional self-management may represent a significant skill for patients with COPD to acquire. Self-management abilities include very simple but powerful behaviors, such as remaining active with enjoyable hobbies, socializing with others, and being physically active in daily life.

Positive and negative emotions have been found to play a significant role in self-management and quality of life in patients with COPD (12). However, little is known about *skills* that can be learned, trained, and perhaps incorporated into current rehabilitative efforts to effectively address the emotions of individuals with COPD. Emotional intelligence (EQ) may be one of those skills.

EQ is the capacity to understand and manage personal thoughts and feelings, as well as to positively influence interpersonal communication and social well-being (13). Currently, there are two main ways to measure EQ: trait EQ, which measures self-perception of emotional factors; and ability EQ, which measures more cognitively based EQ through maximal performance tests (14). Investigating trait EQ is especially pertinent in this population because of the strong relationship between emotional factors and COPD-related well-being and self-management abilities (15–19). Importantly, EQ is a trainable skill that has been used extensively in corporate business (20) to improve well-being and performance.

EQ may also have an important role in the management of chronic disease (21). In fact, research in other chronic diseases revealed that individuals who were less able to regulate and use emotions were two times more likely to develop coronary heart disease, even when age, sex, family history, obesity, hypertension, and smoking were controlled for (22). Patients with cancer scoring higher in EQ tended to have better mental health and increased emotional and social functioning (23), less anxiety (24, 25), and decreased worry (24–26). In addition, higher scores in EQ were related to specific behaviors that translated into better glycemic control (27, 28) as well as decreased anxiety and emotional burnout (27).

EQ—the ability to identify and effectively deal with emotions—may be a feasible treatment avenue to explore for often hard-to-treat emotional components in many patients with COPD. Although strides have been made in assisting patients to make physiological adjustments to living with COPD, such as pulmonary rehabilitation, little emphasis has been placed on trainable clinical programs that impact the emotional aspects of well-being. This is particularly relevant because current emotional treatment options available to patients, such as cognitive behavioral therapy, psychotherapy, and pharmaceutical interventions, have only modest effects at best on COPD outcomes (29).

To date, there has been no report about the association between EQ and meaningful outcomes in COPD, such as quality of life or self-management abilities. Therefore, in this work, we aimed to explore whether EQ, a trainable skill, is meaningfully and independently associated with self-management and disease-specific quality of life. Positive results of this work may be seminal in beginning to investigate the effect of existing EQ training programs to improve COPD well-being.

Methods

Sample

We conducted a cross-sectional, observational study in an outpatient pulmonary clinic at a large teaching hospital in the midwestern United States from April 18, 2013, through May 7, 2014. Individuals with moderate to severe COPD were asked to participate in the study. Participants were screened as eligible if they were older than 18 years of age and attending the clinic's pulmonary division for COPD consultation. Further inclusion criteria included a physician's diagnosis of COPD confirmed by an FEV_1% less than 80% predicted as assessed with pulmonary function tests. The participants completed questionnaires on EQ, quality of life, disease impairment, and self-management abilities, and they also provided personal information and reported their health care use. The questionnaires were completed by each participant independently and confidentially. All pulmonary function tests were performed according to current guidelines and based on established reference values (30). All participants provided written informed consent, and the study was approved by the Mayo Clinic Institutional Review Board.

Questionnaires

Trait Emotional Intelligence Questionnaire. The 30-question Trait Emotional Intelligence Questionnaire version 1.50 (TEIQue) is designed to measure global trait EQ. Participants were asked to rate how much they identified with statements such as "I usually find it difficult to regulate my emotions" and "I often pause and think about my feelings" on a Likert scale ranging from 1 (completely disagree) to 7 (completely agree). A total score was calculated as the sum of scores given for each question. Possible scores ranged from 30 to 210, with a higher score indicating more EQ. Cronbach's α revealed high internal consistency values for both men ($\alpha = 0.88$) and women ($\alpha = 0.87$) (31). In healthy elderly populations (mean age, 66.71 yr), the average TEIQue score was 4.62 ± 0.75 (32).

Self-Management Ability Scale. The Self-Management Ability Scale (SMAS-30) not only provides a total score but also allows its six subdomains to be assessed. Higher scores indicate better self-management abilities. In this validated questionnaire, which is already used with patients with COPD, six core self-management abilities are studied: (*1*) taking

initiative (to be instrumental or self-motivating with regard to the realization of dimensions of well-being), (*2*) investment behavior (to invest in resources for long-term benefits), (*3*) variety (to obtain and maintain various resources for each dimension of well-being), (*4*) multifunctionality (to initiate and maintain activities that serve multiple dimensions of well-being at the same time in a mutually reinforcing way), (*5*) self-efficacy (to gain and maintain a belief in personal competence to achieve well-being), and (*6*) positive frame of mind (to maintain a positive perspective regarding the future rather than focusing on loss) (15). The total score is calculated from the average of the total scores of the six subscales, creating a 100-point scale (with higher scores indicating better self-management) (15). The SMAS-30 has two Likert scales used to assess various facets of self-management. The subscales ask participants to rate different aspects of self management: taking initiatives, investment behavior, variety, and positive frame of mind in a Likert scale from 0-6, and self-efficacy and multifunctionality in a Likert scale from 1-5. The questionnaire has been used extensively among patients with chronic disease and COPD (17–19, 33, 34), is valid in healthy elderly and frail populations, and has good internal consistency reliability ($\alpha = 0.91$) for the total score (15).

Modified Medical Research Council Dyspnea Scale. The modified Medical Research Council Dyspnea Scale (mMRC; range 0–4) (35) comprises five statements describing varying levels of physical activity that may precipitate shortness of breath. Participants are instructed to select the grade that most closely represents their experience. Interrater reliability has been shown to be very good, with a weighted κ value of 0.92 (36).

Chronic Respiratory Questionnaire. The Chronic Respiratory Questionnaire (CRQ) is a 20-question inventory used to assess the areas of dyspnea, fatigue, emotion, and feelings of mastery. It has been widely implemented and validated in patients with COPD. The CRQ asks the patient to rate how often in the last 2 weeks has had a particular feeling or experience on a scale of 1–7, with higher ratings indicating less symptom-related impairment. The CRQ has shown good validity and high internal consistency reliability (37). Its test–retest reliability is adequate in all subscales, but its reliability is particularly high in the subscales of fatigue ($r = 0.90$), emotion ($r = 0.93$), and mastery ($r = 0.91$) (37).

Health care use. Participants were asked to self-report hospitalizations and emergency room (ER) visits occurring within the 12 months preceding study entry, a valid method described in previous studies (38). Participants were asked to indicate whether the hospitalization or ER visit was due to breathlessness or for any other reason.

Sample Size

The sample size was calculated using a multiple regression model to predict the effect of the desired variable (EQ) on the desired outcomes (self-management and disease-specific quality of life), given a probability level of 0.05 ($\alpha = 0.05$). We envisioned that, if significant in the univariate models, five previously evidenced (39, 40) predictors (independent variables)—age, dyspnea, lung function (FEV_1%), body mass index, and a hospitalization in the past year—in addition to the study factor, EQ, would be included in the model. The anticipated effect size for the variable studied (EQ) was greater than 5% (change in R^2 value in the model) with a statistical power of 0.9. The minimum required sample size for the proposed study was 306 participants with complete records.

Statistical Analysis

JMP statistical software (version 9.01; SAS Institute, Cary, NC) was used for all analyses. Descriptive analysis included calculating the mean ± SD. Correlation analyses between the measured variables were performed. Multivariate models were built to investigate the independent effect of EQ on quality of life and self-management (dependent variable) after adjusting for age, lung function, breathlessness, body mass index, and hospitalization in the previous year. We also built a logistic model to predict the ER visits. This model was based on the assumption that emotional factors may contribute to a decision to go to the ER (41). We used bootstrapping methods (1,000 iterations) to confirm the robustness of the models and to build a confidence interval for the adjusted R^2 values of the models. All tests were two-sided, and P values less than 0.05 were considered statistically significant.

Results

A total of 310 individuals with moderate to severe COPD (mean FEV_1%, 42.48 ± 15.85) participated in the study. The participants (mean age, 69.76 ± 9.57 yr; 40% female) completed questionnaires that were used to assess quality of life, symptom severity, and self-management abilities and to gather demographic information (Table 1).

Higher EQ scores were positively associated with self-management abilities and all domains of the CRQ (dyspnea, emotion, fatigue, and mastery) but not with age or degree of bronchial obstruction (FEV_1%) (Table 2).

EQ scores measured with the SMAS-30 were found to be highly correlated with the following facets of self-management: investment behavior ($r = 0.497$), taking initiative ($r = 0.493$), and self-efficacy ($r = 0.511$). They were moderately correlated with variety ($r = 0.413$), multifunctionality ($r = 0.399$), and positive frame of mind ($r = 0.386$). Multivariate linear regression models that included all significant univariate factors are shown in Table 3. EQ was significant across all domains of health-related quality of life and self-management abilities. In a logistic regression model aimed at predicting ER visits, we found that the odds of *not* having ER visits increased by 1% for every 1-point increase in the EQ questionnaire (odds ratio, 1.013; 95% confidence interval, 1.001–1.026; $P = 0.02$) after adjusting for age, FEV_1%, and degree of breathlessness (based on mMRC).

Discussion

Our results suggest that EQ is independently associated with quality of life and self-management abilities after adjusting for age, breathlessness, degree of bronchial obstruction, body mass index, and health care use. These variables used for adjustment are important factors that determine quality of life and many

Table 1. Demographic characteristics

Characteristic	Data
Total number of included patients with COPD	310
Female sex	40%
Age, yr, mean ± SD	69.76 ± 9.57
Living situation	
Alone	22%
Spouse/partner/family/other	78%
BMI, kg/m^2, mean ± SD	28.21 ± 6.72
FEV_1% predicted, mean ± SD	42.48 ± 15.85
FVC % predicted, mean ± SD	70 ± 17.58
RV, % predicted, mean ± SD	176.94 ± 60.58
TLC, %, mean ± SD	112.66 ± 21.50
ADO index, mean ± SD	8.73 ± 2.12
Oxygen use	38%
CPAP	30%
Hospitalization in last 12 months	37%
Emergency room visit in last 12 months	40%
CRQ domains, mean ± SD (min–max)	
Dyspnea	4.83 ± 1.47 (1–7)
Fatigue	4.06 ± 1.30 (1.25–7)
Emotion	4.97 ± 1.18 (1–7)
Mastery	5.09 ± 1.40 (1–7)
SMAS-30, mean ± SD (min–max)	66.22 ± 11.70 (24.25–95.83)
TEIQue, mean ± SD (min–max)	153.43 ± 23.99 (68–201)
mMRC, mean ± SD (min–max)	1.99 ± 1.14 (0–4)
PHQ-2 ⩾2 points*	31%
GAD-2 ⩾2 points†	25%

Definition of abbreviations: ADO = age, dyspnea, airflow obstruction; BMI = body mass index; COPD = chronic obstructive pulmonary disease; CPAP = continuous positive airway pressure; CRQ = Chronic Respiratory Questionnaire; GAD-2 = Generalized Anxiety Disorder Scale-2; mMRC = modified Medical Research Council Dyspnea Scale; PHQ-2 = Patient Health Questionnaire-2; RV = residual volume; SMAS-30 = Self-Management Abilities Scale-30; TEIQue = Trait Emotional Intelligence Questionnaire; TLC = total lung capacity.
*Score ⩾2 points has a 75% positive predictive value of a depressive disorder.
†Score ⩾2 points indicates anxiety or panic disorder.

important outcomes in COPD (39, 40). Importantly, EQ was not related to disease severity or age. Because EQ can be learned, our results may have significant implications for clinical practice.

Our findings extend previous reports in which authors have posited that EQ is significantly associated with important clinical outcomes in chronic disease. Previous studies indicate that emotions and the perception of those emotions influence not only what is attended to but also the physiological symptoms experienced, such as amount of pain (42, 43) and anxiety (2). The latter assumption is very applicable to COPD, as it has been well described (29) that the level of depressive symptoms in patients with COPD is related more to the degree of dyspnea and disability than to ruminative thoughts or endogenous depression, thus explaining the modest effectiveness of medication and psychotherapy in patients with COPD. It is therefore plausible to hypothesize that, just as improvements in EQ positively influence pain perception, increasing EQ may decrease depressive symptoms as well as improve dyspnea and well-being in patients with COPD.

Table 2. Correlations

	FEV_1%	Age	SMAS-30	Dyspnea	Fatigue	Emotion	Mastery
Age	0.067						
SMAS-30	−0.026	0.107					
Dyspnea*	0.393	0.074	0.266				
Fatigue*	0.129	0.116	0.401	0.616			
Emotion*	0.076	0.201	0.465	0.521	0.718		
Mastery*	0.191	0.2	0.355	0.630	0.707	0.748	
TEIQue	−0.054	−0.011	0.577	0.254	0.346	0.481	0.319

Definition of abbreviations: SMAS-30 = Self-Management Abilities Scale-30; TEIQue = Trait Emotional Intelligence Questionnaire.
*Dyspnea, fatigue, emotion, and mastery are domains measured with the Chronic Respiratory Questionnaire.

We also found that EQ directly impacts self-management regardless of disease severity or the patient's age. The latter has significant practical implications; namely, patients with COPD may improve self-management abilities and well-being by improving their EQ skills. EQ not only may provide more control during stressful moments but also may result in better mental and social well-being, which has been shown to contribute to better quality of life (23). We are persuaded that the bottom line of offering new programs or the opportunity to acquire new skills to patients with chronic conditions is improving well-being; being more emotionally intelligent is meaningless unless tangible, real-life experiences are improved.

Importantly, and moving forward from our present work, it is plausible (though yet to be tested) that a trainable skill which promotes the ability to understand and regulate emotions through increased EQ may serve as a buffer against negative emotions and further symptom impairment in COPD. In other words, the ability to reduce the impact of emotions may have the potential to influence what it means to live with a chronic disease (i.e., illness perception). It may also translate to increased well-being, better quality of life, and possibly less health care use. Our exploratory results indicate an independent inverse association of EQ with ER visits, supporting previous literature which suggests that emotional factors, in addition to disease-related factors, influence a person's decision to seek health care (41, 44).

Improving EQ may also help patients with COPD to cope with aspects of the disease perceived as burdensome. Negative emotions are prevalent among individuals with COPD (45–47), to the extent that many feel unworthy of treatment, owing to their shame about being smokers and the stigma of COPD as a self-inflicted disease

Table 3. Multivariate models predicting self-management abilities and quality of life

DV	IV	Multivariate Model		R^2 (95% CI)*	Nonsignificant in the Model
		Estimate	*P* Value		
CRQ dyspnea[†]				34 (0.22–0.47)	
	TEIQue	0.016	<0.0001		Age
	BMI	−0.051	0.0002		
	FEV_1%	0.029	<0.0001		
	Hospitalization[‡]	0.238	0.0220		
CRQ emotion				35 (0.25–0.47)	
	TEIQue	0.022	<0.0001		
	mMRC	−0.231	0.0002		BMI, hospitalization[‡]
	Age	0.0270	0.0002		
	FEV_1%	011	0.010		
CRQ fatigue				27 (0.16–0.39)	
	TEIQue	0.016	<0.0001		FEV_1%, BMI,
	mMRC	−0.319	0.0003		Age, hospitalization[‡]
CRQ mastery				32 (0.21–0.43)	
	TEIQue	0.019	<0.0001		FEV_1%, BMI
	mMRC	−0.370	<0.0001		Hospitalization[‡]
	Age	0.025	0.0115		
SMAS-30				36 (0.24–0.48)	
	TEIQue	0.275	<0.0001		FEV_1%, mMRC, BMI, age, hospitalization

Definition of abbreviations: BMI = body mass index; CI = confidence interval; CRQ = Chronic Respiratory Questionnaire; DV = dependent variable; IV = independent variable; mMRC = modified Medical Research Council Dyspnea Scale; SMAS-30 = Self-Management Abilities Scale-30; TEIQue = Trait Emotional Intelligence Questionnaire.
*Confidence interval is derived from 1,000 bootstrap iterations.
[†]mMRC not included due to collinearity.
[‡]Hospitalization within the past 12 mo.

(3, 48, 49). These negative emotions or feelings of inadequacy may cause some individuals to delay seeking help (50), thereby impairing self-management and further facilitating mounting symptom severity. EQ may provide a framework within which to deal with negative emotions and self-management behaviors of patients with COPD, contributing to their better perception of quality of life. In addition, we found that EQ is highly correlated with three subdomains of SMAS-30 that are significantly related to healthy behaviors and behavior change: taking initiative (51), investment behavior, and self-efficacy (52).

EQ has been found to be a trainable skill in the corporate world (20), and perhaps there is an opportunity to translate the knowledge gained from widespread EQ training in that realm to chronic disease management programs. Increased EQ has been shown to lead to improved quality of life and well-being (21), not only initially after program completion but also in long-term follow-up (21, 53). EQ training programs may include important components to (*1*) increase awareness of and differentiation between positive and negative emotions; (*2*) understand the interaction between emotions and thoughts, and how bodily sensations are tied to emotions; (*3*) manage emotions; (*4*) recognize the interplay between emotions and interpersonal relationships; (*5*) increase motivation; and (*6*) practice relaxation techniques (21) such as mindfulness and meditation (54). Improving EQ may result in more effective coping strategies, alternative solutions to problems, and being more successful in terms of emotional awareness and control.

Mindfulness training, which consists of nonevaluative awareness and focus on the present (55), is particularly suited for boosting EQ and is the foundation of current EQ programs (20). Some mindfulness programs are very well defined and have a significant track record of effectiveness that could be applied in patients with COPD (54, 56, 57).

Limitations

The first limitation of this study is that we measured only one aspect of EQ: trait EQ. There are two different conceptualizations of EQ in the research literature: (*1*) ability approaches, which examine relatively discrete mental abilities that process emotional information (13); and (*2*) trait approaches, in which trait EQ is postulated to be a personality trait occupying the lower levels of the personality hierarchies (58). Among trait EQ measures, one of the most frequently used is the TEIQue (59), which was used in the present study. Although we intended to use both ability and trait approaches, we found it was not feasible because of the time-intensive data collection process.

Furthermore, we cannot claim that that an intervention will improve EQ and outcomes. We conducted a well-powered, cross-sectional, observational study that demonstrates strong and independent associations between EQ and two important outcomes of COPD: quality of life and self-management. However, the results of this study do not imply that there is a cause-and-effect relationship between EQ training and improved outcomes.

Finally, although we found an association between EQ and self-management abilities as measured by the SMAS-30, we did not explore specific COPD self-care behaviors such as daily

self-monitoring for symptoms or use of a written action plan to address worsening symptoms. However, in an exploratory analysis of single items on the SMAS-30, we found that higher EQ scores were positively associated with maintaining activities of interest ($P < 0.0001$) and keeping oneself busy ($P < 0.0001$), which can be considered important behaviors in patients with COPD. Assessment of specific COPD self-care behaviors needs to be part of future studies investigating EQ in patients with COPD.

Conclusions

We describe a possible novel, significant, and potentially trainable skill in patients with COPD. EQ is significantly associated with self-management abilities and all domains of quality of life, regardless of age or disease severity. Because EQ can be learned, its improvement may represent an innovative form of rehabilitation that may complement existing treatment and uniquely fill an existing gap in the treatment of emotional frailty in patients with COPD. ■

Author disclosures are available with the text of this article at www.atsjournals.org.

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