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Family Relationship Quality is Associated with Psychological Distress, Dyspnea, and Quality of Life in COPD

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Abstract

Family relationship quality predicts medical outcomes in various health conditions, including stroke, end stage renal disease, and heart failure. Family relationships also influence the onset and course of depression and anxiety disorders. Family may be particularly important in COPD given the high prevalence of depression and anxiety in COPD patients and the association of depression and anxiety with important clinical features of COPD such as dyspnea. The objective of this study was to test three hypotheses in a sample of individuals with COPD: 1) unsupportive family relationships are associated with psychological distress; 2) psychological distress is associated with dyspnea and impairment in health-related quality of life; and 3) unsupportive family relationships are indirectly associated with dyspnea and health-related quality of life via psychological distress. Cross-sectional data were collected via self-report questionnaires completed by 526 individuals with COPD. Structural equation modeling was used to test the hypotheses. All three hypotheses were supported. Unsupportive family relationships were associated with psychological distress, psychological distress was associated with dyspnea and impairment in health-related quality of life, and unsupportive family relationships were indirectly associated with dyspnea and health-related quality of life via psychological distress. If subsequent longitudinal investigations demonstrate that unsupportive family relationships do indeed lead to psychological distress among individuals with COPD, then interventions to improve family relationships of patients with COPD could lead to reductions in psychological distress and, ultimately, to improvements in dyspnea and quality of life.

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Declaration of Interest

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Keywords

Pulmonary disease; chronic obstructive; Psychological distress; Health status; Family; Interpersonal relations

Introduction

Family relationship quality predicts medical outcomes in stroke (1), end stage renal disease (2), and heart failure (3,4). Important aspects of family relationships include the extent to which family members are critical or blaming of each other, and the extent to which family members can express their feelings with each other and confide in each other. Among stroke patients, family functioning predicts number of hospital days during the first year following a stroke and is a better predictor of rehospitalization than typical predictors of stroke outcome (1). Marital quality predicts mortality among people with end stage renal disease (2) and congestive heart failure (3,4), where marital quality is as strong a predictor of mortality as severity of heart failure (3). Despite these important effects of family relationships in other chronic health conditions, family relationship quality has not been studied extensively among patients with COPD.

Family relationships may be particularly important in COPD given the high prevalence of depression and anxiety among individuals with COPD (5-7). A large body of prospective research indicates that family relationships influence the onset and course of depression and anxiety (8-12). People with marital dissatisfaction are almost three times more likely to develop an episode of depression over a 12-month period than people who are satisfied with their marital relationship (10) and perceived criticism from family members predicts higher rates of relapse in depression (8,9).

Symptoms of depression and anxiety are not only prevalent among individuals with COPD; these symptoms are consistently associated with key clinical features in COPD such as dyspnea (13-16) and health-related quality of life (17-21). Depression and anxiety also predict admission to the hospital following an exacerbation (22) and mortality (23,24). Review of the research indicates that “anxiety and depression have a significant effect on the course of COPD and impact of the disease on patients” (25) (p. 243).

The aim of the present study was to test associations among family relationship quality, psychological distress, and clinical features of COPD. Psychological distress was defined as symptoms of depression and anxiety. The following hypotheses were tested: 1) unsupportive family relationships are associated with psychological distress; 2) psychological distress is associated with dyspnea and impairment in health-related quality of life; and 3) unsupportive family relationships are indirectly associated with dyspnea and health-related quality of life via psychological distress. The overall model is a structural equation model that cross-sectionally tests the premise that unsupportive family relationships lead to psychological distress, which in turn leads to dyspnea and impaired health-related quality of life. This model was based on the prospective research cited above that demonstrates that family relationships influence depression and anxiety (8-12) and predict medical outcomes in other health conditions (1-4). Psychological distress was hypothesized as a mediator due to the well-established association of depression and anxiety with dyspnea (13-16) and health-related quality of life (17-21) in COPD. These analyses provide an initial test to determine whether longitudinal investigation of the causal paths hypothesized in this model is warranted.

By focusing on family relationships, the present study extends research in COPD that has consistently demonstrated an association of depression and anxiety with dyspnea (13-16) and

health-related quality of life (17-21). It is important to understand the extent to which family relationships contribute to psychological problems in COPD. Interventions to reduce depression and anxiety are less likely to be successful if family relationships are contributing to the symptoms of depression and anxiety but are not being addressed. Research on family relationships can foster the development of novel, more effective psychosocial interventions that address both family relationships and psychological distress to improve clinical outcomes in COPD.

Materials and Methods

Sample and Procedures

This protocol was approved by the Institutional Review Board at National Jewish Health and the Colorado Multiple Institutional Review Board. Individuals assessed or treated for COPD at two medical centers in Denver were studied: a tertiary-care respiratory hospital and a university-affiliated public hospital. These two medical centers were chosen to ensure a diverse sample. At the tertiary-care hospital, questionnaires were mailed to individuals with physician-diagnosed COPD who had agreed to be contacted regarding research studies. These individuals included clinic patients with COPD and patients who registered with the clinical research unit who had a diagnosis of COPD. At the public hospital, questionnaires were mailed to all individuals who were being treated for COPD at three internal medicine clinics, as selected via a clinical database of patients at these clinics using ICD-9 codes indicative of COPD. All patients had physician-diagnosed COPD; however, results of lung function tests were not available to the researchers.

All questionnaires were mailed between October 2005 and March 2007. Questionnaires were mailed to 1040 people and were returned by 542 people, a 52% response rate (67% at the tertiary-care respiratory hospital and 31% at the university-affiliated public hospital). Sixteen returned questionnaires were excluded from analyses—5 because of missing data and 11 because the respondent indicated that they did not have COPD. These 11 respondents did not agree with their physician's diagnosis and were excluded because many of the items on the questionnaire only pertain to individuals who self-identify as having COPD. Thus, the final sample was 526 (overall response rate = 51%; see figure 1).

Measures

Demographic, Health, and Disease Characteristics—Tables 1 and 2 show demographic, health, and disease characteristics of the sample. For number of comorbid conditions, respondents indicated whether they had the following health problems: heart disease or heart surgery, hypertension/high blood pressure, arthritis, diabetes or blood sugar problems, bone problems, cancer, and other. The number of positive responses summed. The number of medications prescribed for COPD was summed, with combination inhalers counted as two medications.

Unsupportive Family Relationships—*Criticism* was assessed via the perceived criticism subscale of the Family Emotional Involvement and Criticism Scale (FEICS) and the Perceived Criticism Measure (PCM). The FEICS was developed to assess perceived criticism in medical patients and consists of 7 items (26,27). An example item is “I have to be careful what I do or my family will put me down.” There are five response categories, ranging from “almost never” (which would be scored as a 1 for the example item) to “almost always” (which would be scored as a 5 for the example item). Scores for the 7 items are summed, and the possible range of scores is 7 through 35. The PCM is a single item designed to assess the extent to which the respondent views family members as being critical on a scale ranging from 1 (not at all critical) to 10 (very critical) (9).

Blame was assessed by a single item modeled on the PCM measuring the extent to which a person with COPD views family members as blaming: “To what extent do you think your family blames you for having COPD?” Responses range from 1 (not at all) to 10 (completely).

General family functioning was measured by the 12-item General Functioning subscale of the Family Assessment Device (FAD), which has been used in studies of medical illness (1, 28-30). Questions address aspects of family relationships such as the extent to which family members express feelings with each other, feel accepted by each other, and confide in each other. There are four response categories, ranging from strongly agree to strongly disagree. Responses are coded such that high scores are indicative of less healthy family functioning.

Psychological Distress—Psychological distress was assessed by two indicators: the depression and anxiety subscales of the Hospital Anxiety and Depression Scale (HADS). The HADS was designed to assess symptoms of depression and anxiety in medically ill patients (31) and has been used in many studies of COPD (18,19,32-34).

Clinical Features of COPD—*Dyspnea* was measured by the Modified Medical Research Council Scale (MRC), a 5-point grading scale to measure shortness of breath (35). The MRC is predictive of 5-year survival among people with COPD (36). *Health-related quality of life* (HRQL) was measured by the St. George's Respiratory Questionnaire (SGRQ), a 50-item scale designed for use in patients with airflow limitation (37). All three subscales (Symptoms, Activity, and Impact) were used as indicators of impairment in health-related quality of life.

Analyses

All hypotheses were tested via structural equation models using Mplus 5.0 software (38). Two structural equation models were calculated—one with dyspnea as the dependent variable and one with HRQL as the dependent variable. Structural equation modeling (SEM) was used to analyze data because SEM utilizes multiple indicators of a construct, thereby accounting for measurement error (39,40). Each indicator of a construct should be correlated with the other indicators of that construct; it is this correlation that makes it possible to combine multiple indicators into a single construct such as unsupportive family relationships. SEM was also used because it can simultaneously test an entire model rather than separately testing each of the components of the model. The following three associations were tested in each model: 1) family relationship quality with psychological distress; 2) psychological distress with dyspnea or HRQL; and 3) the indirect path from relationship quality to dyspnea or HRQL via psychological distress. The strength of each of these associations was evaluated both for statistical significance and effect size. The effect size is an especially important measure of the strength of the relationship between two variables when sample size is large as it is not affected by the sample size, whereas statistical significance is highly related to sample size. In SEM the effect size is determined by the standardized path coefficient, with a standardized path coefficient of at least .30 by convention viewed as a medium effect size, and a coefficient of .50 or larger considered a large effect size (39).

Results

Preliminary Analyses

Demographic characteristics of the sample are presented in Table 1. Participants from the tertiary care hospital differed from participants from the public hospital with regard to age, race/ethnicity, relationship status, education, and income. Health and disease characteristics of the sample are presented in Table 2. Participants from the two medical centers differed in body mass index, number of comorbid conditions, and oxygen use, but did not differ on pack-years smoked, years since COPD diagnosis, and number of medications prescribed for COPD.

Means and standard deviations for all of the family, psychological, and clinical variables used in the structural equation models are presented in Table 3. Participants from the two hospitals differed on all of these variables with the exception of blame. The criticism score on the FEICS can range from 7 to 35, and responses did range from 7 to 35 in this sample. The mean was 11.3, which indicates that, on average, respondents perceived their families as being slightly critical. The criticism score on the PCM can range from 1 to 10 and respondents in this sample did utilize the full range of possible scores. The mean was 2.8, which again suggests that respondents, on average, perceived their families as slightly critical. Blame scores could range from 1 to 10 and respondents utilized the full range of possible scores. The mean was 3.9, which is again on the lower end of the possible range of scores. Scores for general family functioning could range from 1 to 4, with a higher score indicating less healthy family functioning. Actual scores in this sample did range from 1 to 4. The mean score of 1.9 indicates that, on average, families were on the healthy end of the spectrum.

Symptoms of depression and anxiety could each range from 0 to 21. Symptoms of depression in this sample ranged from 0 to 17 and symptoms of anxiety ranged from 0 to 19. The HADS has established scoring bands that are the same for both the depression and anxiety subscales: a score of 0 to 7 is considered normal, 8 to 10 is mild, 11 to 14 is moderate, and 15 to 21 is severe. Using these cutoffs, 66.5% of respondents were in the normal range for depression, 19.8% were in the mild range, 10.5% were in the moderate range, and 3.3% were in the severe range. For anxiety, 58.5% of respondents were in the normal range, 22.6% were in the mild range, 11.8% were in the moderate range, and 7.1% were in the severe range.

Responses on the MRC could range from 1 to 5 with a higher score indicating more dyspnea. The full range of possible responses was used, with a mean of 2.9. All three subscales of the SGRQ could range from 0 to 100, with 0 indicating the best possible health and 100 indicating the worst possible health. Scores on the symptoms subscale ranged from 0 to 100 with a mean of 47.2. Scores on the activity subscale ranged from 0 to 100 with a mean of 65.3. Scores on the impact subscale ranged from 0 to 96.8 with a mean of 36.6.

Bivariate correlations among the family, psychological, and clinical variables are presented in Table 4.

Testing for Potential Moderators

Since individuals from the two hospitals differed on many characteristics, the potential moderating effect of hospital was examined to determine whether it was necessary to test hypotheses separately by hospital. The moderating effect was tested by comparing a structural equation model for dyspnea that constrained all path coefficients to be identical for the two hospitals with a series of three models that allowed path coefficients to differ between the two hospitals. The constrained model was compared to: 1) a model in which the path from family to psychological distress was allowed to differ by hospital, 2) a model in which the path from psychological distress to dyspnea was allowed to differ by hospital, and 3) a model in which the path from family to dyspnea was allowed to differ by hospital. The goal was to determine whether model fit was significantly improved by estimating each path separately by hospital, as opposed to using a single estimate for each path regardless of hospital. Significant improvement in model fit was determined by comparing the χ^2 values for constrained and unconstrained models to determine whether the reduction in χ^2 was worth the loss of a degree of freedom. If the reduction in χ^2 was greater than 3.84, then the path coefficient being tested differed by hospital at $p < .05$. This same process was used to test whether hospital was a moderator in the model for HRQL. The reduction in χ^2 was less than 3.84 in all six tests. Thus, none of the paths in the model for dyspnea or the model for HRQL differed by hospital.

The potential moderating effect of gender, socioeconomic status, oxygen use, and relationship status were tested via the same method. Gender, socioeconomic status, and oxygen use did not moderate any path in the model for dyspnea or the model for HRQL. However, relationship status was a moderator of four of the six paths. For each of the hypothesized paths, participants who were in a couple (married or a member of an unmarried couple) had stronger effects than participants who were single (widowed, never married, or divorced/separated). For example, in the model for dyspnea the standardized coefficient of the path from family to psychological distress was .60 for participants who were single and .74 for participants who were coupled. Both paths were statistically significant and both paths had a large effect size. This was true of all of the hypothesized paths: while the effect was stronger for coupled participants than for single participants, the effect was statistically significant for both coupled and single participants and the effect size was large for both coupled and single participants. Given that the moderating effect of relationship status was simply a matter of degree and did not alter substantive conclusions, all hypotheses were tested for the entire sample rather than splitting the sample by relationship status.

Hypothesis Testing

The hypotheses were tested using two structural equation models—one with dyspnea as the dependent variable (see Figure 2) and one with HRQL as the dependent variable (see Figure 3). Model fit indices are used to determine how well the model being tested fits the data. Both the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) measure the extent to which the model being tested is an improvement compared to a baseline model. Since these fit indices are measuring improvement a high value is desirable, and values of both the CFI and TLI should be above .95 (41). The Root Mean Square Error of Approximation (RMSEA) is a measure of lack of fit of the model being tested and the Standardized Root Mean Square Residual (SRMR) is based on the difference between the predicted covariance and observed covariance. Low values are desirable, and values of both the RMSEA and SRMR should be below .08 (41,42). All four of these fit indices for both models indicated that the model fit the data well and are included in Figures 2 and 3. Given that the models fit the data well, the paths testing each of the hypotheses were examined.

Hypothesis 1—Hypothesis 1 states that unsupportive family relationships are associated with psychological distress. The path from family relationships to psychological distress was highly significant in both models ($p < .001$), and the standardized path coefficient in both models was .67, indicating a large effect size.

Hypothesis 2—Hypothesis 2 states that psychological distress is associated with dyspnea and HRQL. The paths from psychological distress to both dyspnea and HRQL were highly significant ($p < .001$), with standardized path coefficients of .56 and .85, respectively, indicating large effect sizes.

Hypothesis 3—Hypothesis three states that unsupportive family relationships are indirectly associated with dyspnea and HRQL via psychological distress. This hypothesis was tested by the strength of the indirect paths from family relationships to dyspnea and quality of life via psychological distress. These indirect paths were highly significant ($p < .001$) in both models, with standardized path coefficients of .38 and .57 indicating a medium effect size for dyspnea and a large effect size for HRQL. The direct paths from family relationships to dyspnea and health-related quality of life were not statistically significant, suggesting that the association between family relationships and these clinical features of COPD is fully mediated by psychological distress.

Discussion

The analyses described above test paths in structural equation models that support the premise that unsupportive family relationships lead to psychological distress, which in turn leads to dyspnea and impaired health-related quality of life. These models also suggest that family relationships influence dyspnea and health-related quality of life via psychological distress. The indirect paths from family relationships to dyspnea and health-related quality of life via psychological distress were significant, while the direct paths from family relationships to these clinical features of COPD were not significant. Since the data in the present study were cross-sectional, the direction of causality cannot be inferred solely from these data. However, the hypothesized direction of effect is consistent with previous prospective research demonstrating that family relationship quality influences the onset and course of depression and anxiety (8-12) and predicts medical outcomes in other health conditions (1-4). These results indicate that subsequent longitudinal research is needed.

Results of this study should be interpreted in light of limitations of the study. As discussed above, the analyses are based on cross-sectional data. Longitudinal studies are needed to establish the direction of causality. Indeed, it is likely that these variables have a complex interrelationship, which may even be cyclical (43,44). For example, psychological distress may lead to dyspnea, which in turn may lead to more psychological distress. A second limitation is that 51% of the individuals who received a survey returned it. While this is a respectable response rate for a postal questionnaire, it may affect generalizability of findings due to a possible response bias. A third limitation is that information regarding actual diagnosis of depression or anxiety was not gathered. This line of research will be strengthened by investigating both symptoms of psychological distress and actual diagnoses of depression or anxiety. A fourth limitation of this study is that spirometry results were not available for use in describing the severity of COPD in this sample and examining whether severity moderates the association of family relationship quality with psychological distress, dyspnea, and quality of life. Finally, future research should include multiple reporters, including family members of COPD patients, to provide a richer assessment of the family environment.

Strengths of this study include the fact that participants were recruited from two hospitals with patients with very different demographic, family, psychological, and clinical profiles. This large and diverse sample of COPD patients made it possible to test for moderating effects of hospital. Despite the fact that patients from the tertiary care hospital and the public hospital differed from each other on nearly every variable tested, the associations among family relationships, psychological distress, and clinical features did not differ by hospital. For example, even though patients from the public hospital reported more unsupportive family relationships and more psychological distress than patients from the tertiary care hospital, the association between family relationships and psychological distress did not differ between hospitals. Results of testing for a moderating effect of hospital indicated that estimating this path separately by hospital did not improve model fit enough to warrant the loss of the degree of freedom associated with modeling two separate paths rather than a single path. This was true of all six tests for a moderating effect of hospital.

This diverse sample also made it possible to test for moderating effects of gender, socioeconomic status, oxygen use, and relationship status. Of these four additional possible moderators, relationship status was the only one with evidence of a moderating effect. This suggests that relationship status may be an important moderator to investigate in future analyses. The overwhelmingly nonsignificant findings of the tests for moderators suggest that the model tested is relevant to a broad range of patients with COPD.

This study extends the research on mental health in COPD by including a focus on family relationship quality. Family relationship quality may be particularly important in COPD because it is a modifiable risk factor for depression and anxiety (8-12), psychological conditions which are highly prevalent among individuals with COPD (5,45). If additional research supports the findings of the present study, the primary clinical implication is that health care professionals who are working with individuals with COPD should recognize the importance of family relationships and be prepared to refer patients and their families for relational treatment once they have identified the existence of family problems. If depression and anxiety occur in the context of unsupportive family relationships, then the most effective treatment will include a family component that addresses the family dynamics that are contributing to the depression and anxiety. Family and relational treatments already have demonstrated effectiveness in treating depressive and anxiety disorders (11,12,46,47), and family-based treatments have led to improvements in medical outcomes in health conditions other than COPD (48,49). For example, marital communication training leads to improved blood pressure control among people with hypertension (48).

In the present study, the construct of unsupportive family relationships was treated as a continuous variable. An important avenue for future research is to determine whether there are qualitatively distinct categories or types of unsupportive family relationships that lead to different illness trajectories. Such research could determine, for example, whether families that are both highly critical and highly blaming lead to worse psychological distress and clinical outcomes than families that are critical but not blaming. A first step in this line of research would be to determine whether clinically significant cut points for criticism and blame exist, and if so, what these cut points are. At present, cut points to determine high levels of criticism and blame have not yet been established.

The present study is important in that it is, to our knowledge, the first study to link family relationship quality with psychological distress and clinical features of COPD. Longitudinal research is now needed to firmly establish the directionality of these associations. Future research should also investigate the extent to which family relationships and psychological distress affect key health behaviors in COPD such as smoking, treatment adherence, and physical activity. In fact, it is likely that health behaviors are an important pathway through which psychological distress affects dyspnea and health-related quality of life. This line of research can provide crucial data that form the basis of novel psychosocial interventions to improve clinical outcomes for people with COPD. Family relationships may be an important avenue for intervention that has yet to be addressed in COPD.

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Figure 1.
Recruitment Flow Diagram

Figure 2.

Maximum Likelihood Estimates of the Associations among Family Relationships, Psychological Distress, and Dyspnea

Note: Standardized path coefficients outside parenthesis, unstandardized within parentheses

Figure 3.

Maximum Likelihood Estimates of the Associations among Family Relationships, Psychological Distress, and Impaired Health-Related Quality of Life

Note: Standardized path coefficients outside parenthesis, unstandardized within parentheses

Table 1

Demographic Characteristics of the Sample

	Combined Sample (n = 526)	Tertiary Care (n = 402)	Public Hospital (n = 124)	P Value for Comparison
Variable	N (%)	N (%)	N (%)	
Gender				0.07
Male	275 (52.4)	219 (54.6)	56 (45.2)	
Female	250 (47.6)	182 (45.4)	68 (54.8)	
Age				0.01
Less than 60	113 (21.5)	74 (18.4)	39 (31.5)	
60 to 64	100 (19.0)	75 (18.7)	25 (20.2)	
65 to 69	115 (21.9)	88 (21.9)	27 (21.8)	
70 to 74	95 (18.1)	77 (19.2)	18 (14.5)	
75 or more	103 (19.6)	88 (21.9)	15 (12.1)	
Race/ethnicity				<0.001
Caucasian non-Hispanic	448 (85.2)	379 (94.3)	69 (55.6)	
Black non-Hispanic	31 (5.9)	10 (2.5)	21 (16.9)	
Hispanic	38 (7.2)	8 (2.0)	30 (24.2)	
Other	9 (1.7)	5 (1.2)	4 (3.2)	
Relationship Status				<0.001
Married	265 (50.5)	244 (60.8)	21 (16.9)	
Member of an unmarried couple	13 (2.5)	8 (2.0)	5 (4.0)	
Divorced/separated	148 (28.2)	87 (21.7)	61 (49.2)	
Widowed	66 (12.6)	47 (11.7)	19 (15.3)	
Never married	33 (6.3)	15 (3.7)	18 (14.5)	
Education				<0.001
Some high school or less	68 (13.1)	29 (7.3)	39 (31.5)	
High school graduate	130 (25.0)	95 (23.9)	35 (28.2)	
Some college or technical school	203 (39.0)	161 (40.6)	42 (33.9)	
College graduate	120 (23.0)	112 (28.2)	8 (6.5)	
Income				<0.001
Less than \$15,000	166 (33.0)	64 (16.7)	102 (85.0)	
Between \$15,001 and \$25,000	66 (13.1)	52 (13.6)	14 (11.7)	
Between \$25,001 and \$35,000	79 (15.7)	78 (20.4)	1 (0.8)	
Between \$35,001 and \$50,000	62 (12.3)	61 (15.9)	1 (0.8)	

	Combined Sample (n = 526)	Tertiary Care (n = 402)	Public Hospital (n = 124)	P Value for Comparison
Variable	N (%)	N (%)	N (%)	
Between \$50,001 and \$75,000	63 (12.5)	62 (16.2)	1 (0.8)	
\$75,001 or more	67 (13.3)	66 (17.2)	1 (0.8)	

Table 2

Health and Disease Characteristics of the Sample

	Combined Sample (n = 526)	Tertiary Care (n = 402)	Public Hospital (n = 124)	P Value for Comparison
Variable	M (SD)	M (SD)	M (SD)	
Body Mass Index	27.1 (6.6)	26.7 (6.0)	28.6 (8.2)	0.02
Number of Comorbid Conditions	1.7 (1.1)	1.6 (1.1)	2.1 (1.1)	<0.001
Pack-Years	53.7 (30.7)	54.3 (29.0)	51.6 (36.2)	0.41
Number of Years had COPD	6.3 (5.2)	6.4 (5.3)	6.0 (4.9)	0.46
Number of Medications for COPD	3.3 (1.9)	3.3 (2.0)	3.1 (1.7)	0.28
Variable	N (%)	N (%)	N (%)	
Using oxygen for COPD				0.04
No	184 (35.6)	131 (33.2)	53 (43.4)	
Yes	333 (64.4)	264 (66.8)	69 (56.6)	

Table 3

Family, Psychological, and Clinical Characteristics of the Sample

	Combined Sample (n = 526)	Tertiary Care (n = 402)	Public Hospital (n = 124)	P Value for Comparison
Variable	M (SD)	M (SD)	M (SD)	
<i>Family Characteristics</i>				
Criticism (measured by FEICS)	11.3 (4.9)	10.7 (4.3)	13.5 (6.3)	<0.001
Criticism (measured by PCM)	2.8 (2.4)	2.7 (2.3)	3.3 (2.9)	0.06
Blame	3.9 (3.4)	3.9 (3.4)	4.2 (3.7)	0.47
General Family Functioning	1.9 (0.6)	1.8 (0.5)	2.0 (0.6)	<0.01
<i>Psychological Characteristics</i>				
Symptoms of Depression	6.1 (3.8)	5.7 (3.7)	7.2 (4.0)	<0.001
Symptoms of Anxiety	6.9 (4.3)	6.3 (4.1)	8.9 (4.7)	<0.001
<i>Clinical Characteristics</i>				
Dyspnea	2.9 (1.1)	2.8 (1.1)	3.2 (1.1)	<0.001
HRQL: Symptoms	47.2 (25.7)	43.9 (24.5)	58.9 (26.4)	<0.001
HRQL: Activity	65.3 (22.1)	63.1 (21.7)	72.9 (22.1)	<0.001
HRQL: Impact	36.6 (20.8)	33.9 (19.5)	45.9 (22.8)	<0.001

Table 4

Pearson Correlations among Family, Psychological, and Clinical Variables

	1	2	3	4	5	6	7	8	9	10
<i>Family Variables</i>										
1 Criticism (measured by FEICS)	1.00									
2 Criticism (measured by PCM)	.51***	1.00								
3 Blame	.25***	.33***	1.00							
4 General Family Functioning	.48***	.47***	.27***	1.00						
<i>Psychological Variables</i>										
5 Symptoms of Depression	.36***	.41***	.24***	.42***	1.00					
6 Symptoms of Anxiety	.42***	.42***	.21***	.38***	.70***	1.00				
<i>Clinical Variables</i>										
7 Dyspnea	.21***	.18***	.09	.20***	.45***	.34***	1.00			
8 HRQL: Symptoms	.24***	.26***	.16**	.21***	.50***	.46***	.46***	1.00		
9 HRQL: Activity	.22***	.17***	.13**	.21***	.52***	.36***	.69***	.50***	1.00	
10 HRQL: Impact	.33***	.31***	.17***	.28***	.67***	.55***	.58***	.66***	.72***	1.00

Note:

* significant at $p < .05$

** significant at $p < .01$

*** significant at $p < .001$