Title
The impact of gender, disease severity, affect and mood on the intensity of activity-related dyspnea in chronic obstructive pulmonary disease

Author
Klosinski, Jean M.

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The Impact of Gender, Disease Severity, Affect and Mood on the Intensity of Activity-Related Dyspnea in Chronic Obstructive Pulmonary Disease

by

Jean M. Klosinski

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Jean M. Klosinski

Abstract

The purposes of this study were to determine the impact of age, gender, disease severity, affect, and mood on the intensity of activity-related dyspnea in COPD; and to determine the concurrent validity of the Profile Of Mood States (POMS) instrument and Positive And Negative Affect Scale (PANAS). This cross-sectional study was a secondary multivariate analysis of a larger randomized, clinical trial. The convenience sample of 115 subjects consisted of 62 females (54%) and 53 males (46%) with a combined mean age of 65.6 years. Male subjects (mean = 40.38, SD = 14.14) had significantly lower FEV_1 % predicted than the female subjects (mean = 48.33, SD = 13.97, p= .003). There were no significant gender differences in age, affect, mood, and severity of activity-related dyspnea. The regression model with eleven predictor variables explained 39.6 percent of the variance in the intensity of activity-related dyspnea ($F_{11, 103}$= 6.15, p < .0001). Gender, FEV_1 % predicted, positive affect, anxiety and fatigue had significant unique contributions to explain the variance of the intensity of dyspnea (p < .001). Females reported similar levels of dyspnea intensity as the men in this sample, despite a higher FEV_1 % predicted. The POMS and PANAS demonstrated concurrent validity (p < .001). Dyspnea is a complex, multifaceted and multidimensional phenomenon that includes physiologic and psychologic components. Educational and treatment modalities to reduce disability in COPD patients must be individualized, keeping in mind possible gender differences. Psychological assessment techniques and interventions should be integrated into a patient's plan of care.

Chairperson of Thesis Committee: Virginia Carrieri-Kohlman, DNSc, RN, FAAN
Signature: Virginia Carrieri-Kohlman

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The Impact of Gender, Severity of Disease, Affect, and Mood on the Intensity of Activity-Related Dyspnea in Chronic Obstructive Pulmonary Disease

Introduction

Chronic obstructive pulmonary disease (COPD), characterized by hyperinflation and expiratory airflow obstruction, is the fourth-leading cause of death and affects an estimated 14 million people in the United States.[1,2] In addition, approximately 10 million individuals suffer from asthma.[3] The incidence and mortality of COPD are increasing for both men and women.[4] Dyspnea is the most common symptom experienced by COPD patients[5], which limits patients' abilities to perform activities of daily living. Subsequently, COPD has been ranked the second most debilitating disease.[6] Other patients likely to suffer from dyspnea are those with interstitial disease, neuromuscular disorders, lung cancer, cardiac disease, and acute disorders, such as pneumonia. As the number of individuals afflicted with these disease states rises, there will be an increasing prevalence of dyspnea.[4]

Physical symptoms are generally based on physiological and/or pathological changes, but these changes often inadequately explain the experience and perception of symptoms.[7,8] Van Wijk and colleagues proposed in their symptom perception model that perceived symptoms are influenced by cognition, personality traits, environment, expectation and physiological state.[8] Specifically, symptom perception has been found to be influenced by age[9], gender[10], negative affect[11], mood[12], and environment.[13] Similarly, prior research has demonstrated that physiologic pulmonary disease, as measured by FEV_1% predicted, has been a poor predictor of dyspnea in COPD patients.[14-16] Dyspnea or shortness of breath could also be moderated by cognitive, psychosocial and environmental factors. The American Thoracic Society (ATS) recently published a consensus statement that defined dyspnea as "a term used to characterize a subjective experience of breathing discomfort that consists of qualitatively distinct sensations that vary in intensity" (p. 322).[3] There has been little research to date that has measured the impact of age, gender, disease severity, affect and mood on the intensity of dyspnea with activities.

Age has been associated with altered sensations and perceptions of symptoms. Prior research studies have reported that older individuals report less severe dyspnea than younger subjects.[5,17,18] Older individuals may have decreased sensation or perception of physiologic changes than younger people, as a result of decreases in integrative functions of the central nervous system with advancing age.[19]

Research studies about gender differences in symptom reporting have been numerous. In a review of relevant literature, the majority of studies concluded that women report higher rates of physical symptoms than their male counterparts.[8] In another study, women with COPD reported more disability, and dissatisfaction with life and marital relationships.[20] It is unclear whether this difference is the result of varying levels of negative affect or mood between the genders. Although gender has been shown to influence the reported frequency of symptoms, there are conflicting results related to the influence of gender on the intensity of dyspnea.

Affect and mood are related to the psychic, somatic and behavioral components of emotions.[21] Affect is a subjective or observed expression of emotion, expressed via facial, vocal, and bodily gestures.[21] The individual's affect or expression of emotion may or may not correspond to the individual's mood. Affect is usually described as appropriate, inappropriate, blunted, constricted, flat or labile. Affect has been further delineated into two highly distinctive dimensions, positive affect (PA) and negative affect (NA). PA is the degree to which an individual expresses enthusiasm, activity and alertness.[22] NA is characterized by subjective distress and unpleasantness that results in aversive mood states, such as anger, disgust, fear, nervousness, contempt, and guilt.[22] Negative affect correlates with poor coping, stress, unpleasant events and health complaints.[11,22,23] In contrast, positive affect is associated with pleasant events, satisfaction and social activity.[22,23] There is conflicting data about the relationship between PA and NA, as measured by various scales. The majority of studies demonstrate low or nonsignificant correlations between NA and PA.[22,24] The relationship between affect and mood has not been compared or established in the COPD population. Also, the influence of affect on the perception of dyspnea has yet to be investigated in COPD patients.

Mood is defined as the pervasive and sustained internal sensation of emotion that is subjectively experienced by individuals and influences their perception of the world.[21] Examples of descriptors of mood are feelings of depression, anger, anxiety, guilt, and euphoria. Often the definitions of mood and affect are overlapped and interchanged in the literature. Mood has been investigated in COPD patients, as related to functioning and symptoms. The quality and intensity of dyspnea has been found to be moderated by various emotional states, including anxiety, distress, depression, tension, and anger.[6] Specifically, individuals with higher levels of anxiety, anger, depression and cognitive disturbances have reported more respiratory symptoms.[25-27] Patients experience greater levels of distress when dyspnea is severe.[3] Also, dyspnea is positively correlated with fatigue, contributing to the intensity of dyspnea experienced by COPD patients.[27,28]

Purpose

The primary aim of this study was to determine the impact of age, gender, disease severity, affect and mood on the intensity of activity related dyspnea in COPD patients. The secondary aim was to test the concurrent validity of the Positive and Negative Affect Scale (PANAS) with the Profile of Mood States (POMS), a frequently used measure of mood.

Theoretical Model

Symptom Perception Model suggests that individuals with high negative mood states are more attentive to bodily sensations and thus over report the frequency and intensity of symptoms.[8] In the Symptom Perception Model, a symptom is defined as "an adversely perceived internal state" (p. 235).[8] This definition is based on the assumption that symptoms are the result of perceptual processes. This differs from the more traditional definition that symptoms are the sign of disease or illness. The symptom perception model shown in Figure 1 is based on an information-processing model and consists of six chronological steps: (1) information input of somatic information, (2) selection of information through attentional processes, (3) detection of somatic sensations, (4) attribution of sensations to somatic or psychological causes, (5) the role of negative affectivity, and finally (6) the output of somatic or psychological distress and illness behavior (p. 236).[8] Negative mood and affectivity are personality characteristics that are believed to enhance symptom distress by boosting the internal perception of bodily sensations and somatic interpretation.

Methods

Study Design

This cross-sectional correlational study used baseline data from a larger randomized clinical trial that investigating the effect of education and exercise on three treatment groups with COPD. Baseline data for the larger experimental study was collected from February 1996 to March 1999. The University of California, San Francisco, Committee of Human Research approved the study.

Sample Recruitment & Selection

A convenience sample of 814 subjects was recruited via physician referral, newspaper advertisements, and recruitment fliers. One hundred and eighty-three subjects were accepted after the initial telephone-screening interview. The 183 subjects were examined and received spirometry testing. Of the 183 subjects, 115 (F= 62, M= 53) met the following inclusion criteria for the larger randomized clinical trial: (1) diagnosis of COPD (emphysema, chronic bronchitis, chronic irreversible asthma), (2) airflow obstruction defined by spirometry (FEV_1% predicted < 60 and/or FEV_1/FVC % predicted < 60), (3) age $\geq$ 40 years, (4) no evidence of other symptomatic disease processes, and (5) English speaking. Sixty-eight of the initial 183 did not meet the inclusion criteria: 41 subjects had FEV_1% predicted and/or FEV_1/FVC % predicted >60, and 27 were unable to complete a baseline incremental treadmill test without ischemic changes, desaturation below 75% and/or musculoskeletal limitations.

The spirometry inclusion criterion and nomenclature was based on the American Thoracic Society's diagnostic criteria for obstructive disease.[2] The basic parameters for spirometry interpretation used were forced vital capacity (FVC), forced expiratory volume in one minute (FEV_1), and FEV_1/FVC ratio.[3] These measurements were based on the age, sex, size and race of the subject being tested. If the FEV_1/FVC ratio was below normal range, the severity of obstructive pulmonary disease was categorized based on actual or percent, predicted values of FEV_1.[23] The severity of obstructive abnormalities was graded based on the following ATS criteria: "moderately severe" obstruction ($50 \leq FEV_1$ % pred.< 60); "severe" obstruction ($34 \leq FEV_1$ % pred.< 50); and "very severe" obstruction

(FEV_1 % pred.< 34). FEV_1 and FVC measurements have demonstrated reproducibility, typically plus or minus five percent.[3]

Instruments

A summary of the instruments and variables are found in Table 1. The Positive and Negative Affect Schedule (PANAS) was used to measure positive and negative affectivity. PANAS, a self-report instrument, consists of 20 adjectives of feeling and emotion. Ten of the adjectives measure positive affect and 10 measure negative affect. Subjects were asked to indicate to what extent they have felt this way during "the past few weeks." Subjects rated their feelings and emotions based on an ordinal scale from 1 to 5 (1= very slight or not at all, 2= a little, 3= moderately, 4= quite a bit, and 5=extremely).[22] Adjectives measuring positive affect included the following: interested, excited, strong, enthusiastic, proud, alert, inspired, determined, attentive, and active. Adjectives measuring negative affect included distressed, upset, guilty, scared, hostile, irritable, ashamed, nervous, jittery and afraid. The sum of scores for PA (minimum= 10, maximum= 50) and negative affect (minimum= 10, maximum= 50) were calculated separately.[22]

The scale validity for the PANAS has demonstrated convergent and discriminant validity.[22] PANAS has demonstrated concurrent validity with the Hopkins Symptom Checklist (r= .74), Beck Depression Scale (r= .58) and State-Trait Anxiety Inventory State Anxiety Scale (r= .51).[22] PANAS has been shown to be a reliable instrument for measuring affect over the "past few weeks" (PA = .87, NA = .87).[22] The test-retest reliabilities of the PANAS demonstrated stability over time (PA = .58, NA= .48).[22] Normative scores have been established in college students and psychiatric outpatients, but have yet to be established in COPD patients.

Profile of Mood States (POMS) was used to measure mood experienced by COPD subjects. The short form of 30 adjectives versus 65 was selected because of the ease of completion and larger print format often needed for elderly subjects. The six scales, each with five adjectives, consist of the following mood factors: Tension-Anxiety (TA), Depression-Dejection (DD), Anger-Hostility (AH), Vigor-Activity (VA), Fatigue-Inertia (FI), and Confusion-Bewilderment (CB).[30] Subjects were asked how they had been feeling during the past week including the day of testing. The subjects were asked to rate each of the 30-items (0= not at all, 1= a little, 2 = moderately, 3 = quite a bit, and 4=extremely).[30] Scores for each of the six mood subscales were obtained by summing the ratings for the adjectives defining that factor (minimum= 0, maximum= 20). A total mood disturbance score of the six primary mood factors was calculated by summing the 30-items with the vigor-activity subscale weighted negatively (minimum= -20, maximum= 100). The POMS has demonstrated concurrent validity with the Manifest Anxiety Scale, Beck Depression Scale and MMPI-2.[30] Internal consistencies of .90 or greater have been established for each of the six mood factors (TA, r = .86-.88;

DD, r= .81-.83; AH, r= .97-.89; VA, r= .89-.90; FI, r= .89-.91; and CB, r= .75-.79).[30]

The instrument used to measure activity-related dyspnea was the Shortness of Breath Questionnaire from the University of California, San Diego.[31] The Shortness of Breath Questionnaire (SOBQ) is a 25-item self-reported measure of shortness of breath, during 21 different activities of daily living at varying levels of exertion. Subjects are asked to rate the intensity of shortness of breath based on a 6-point scale (0=not at all to 5=maximal or unable to perform because of dyspnea).[31] The total score is calculated by summing all 24 responses, resulting in a minimum score of zero and a maximal score of 120.[31] SOBQ has demonstrated negative correlation with FEV_1, percent predicted ($r = -49$, $p < 0.01$), $FEV_1/FVC\%$ predicted ($r = -0.50$, $p < 0.01$), and the Quality of Well-being scale ($r = -0.04$, $p<0.01$).[31] SOBQ is positively correlated with the modified BORG scale ($r = 0.42$, $p<0.01$) and the CESD ($r = 0.35$, $p<0.05$).[31] The SOBQs internal consistency equaled an alpha level of 0.96.[31]

Procedures

After a full description of the study, subjects signed consent forms for participation in the study. Baseline testing and data collection occurred over a three-day period. On Day One of baseline testing, physical assessments were performed on all subjects, followed by spirometry testing. Baseline FEV_1, $FEV_1\%$ predicted, FVC and FEV_1/FVC were based on the best of three spirometric measurements. Subjects then received an inhaled bronchodilator with spacer (two puffs, three minutes apart). Post-dilator spirometry was performed 15 minutes after administration of a bronchodilator. FEV_1, $FEV_1\%$ predicted, FVC and FEV_1/FVC were similarly based on the best of three spirometric measurements. FEV_1 and FVC percent predicted were calculated based on age, sex and height of each subject. After the physical exam and spirometric measurement, subjects received two of three instruments, including the POMS and SOBQ. The PANAS was completed on the third day of baseline testing. The order of the instruments was constant among subjects. Over this three-day period, subjects received exercise testing for the larger randomized clinical trial.

Statistical analysis

All statistical analyses were computed utilizing SPSS 9.0 software. Means and standard deviations were calculated for age, FEV_1 percent predicted, and instrument scores. Gender differences were examined with independent t-tests. For the primary aim of the study multiple regression analysis was used to predict the contribution of 11 independent variables on the dependent variable of intensity of activity-related dyspnea. The eleven variables (age, gender, FEV_1 % predicted, positive & negative affect, six POMS mood subscales) were entered simultaneously into the regression equation. The Pearson correlation coefficient was used to determine the concurrent validity of the POMS and PANAS, which was the secondary aim of the study. The level of significance was set at an alpha less than .05.

Results

Sample Characteristics

Sample characteristics and gender comparisons are summarized in Table 2. The 115 subjects consisted of 62 females (54%) 53 males (46%) with a combined mean age of 65.6 years (SD= 8.25). The mean FEV1 % predicted was 44.67 (SD= 14.54). The ethnicity of the sample consisted of Caucasians (n = 98, 85%), Blacks (n = 9, 8%), Asians (n = 5, 4%), and Hispanics (n= 3, 3%). There were no significant gender differences in age, affectivity, mood subscales, total mood disturbance scores, and activity-related dyspnea. Based on ATS grading criteria, this sample had "severe" pulmonary obstruction ($34 \leq FEV_1 < 50$). Although both men and women had severe pulmonary disease, the male subjects had significantly lower FEV_1 % predicted than the female subjects ($p = .003$).

Primary Aim: Regression Model with Predictor Variables

The results of the regression model of 11 variables are summarized in Table 3. Overall, the regression model explained 39.6 percent of the variance in intensity of activity-related dyspnea ($F_{11, 103} = 6.15$, $p < .0001$). Gender, FEV_1 % predicted, positive affect, tension-anxiety and fatigue-inertia (5 of the 11 variables) had significant unique contributions to explaining the variance in intensity of activity-related dyspnea. FEV_1 % predicted had a significant negative relationship ($\beta = -.288$) with the intensity of activity-related dyspnea. Positive affect from the PANAS, tension-anxiety, and fatigue-inertia from the POMS demonstrated significant positive relationships with the intensity of dyspnea with activities. Females (F=1) in this sample had similar levels of dyspnea intensity as the males (M=2), despite having less severe disease (>FEV_1%pred.). Age, negative affect, depression-dejection, anger-hostility, vigor-activity, and confusion-bewilderment (6 of the 11 variables) had no significant contribution towards the intensity of activity-related dyspnea.

Secondary Aim: Concurrent Validity

The correlations between the POMS and the PANAS are summarized in Table 4. Overall, the PANAS instrument demonstrated concurrent validity with the POMS total mood disturbance scores. The relationships between the two instruments were consistent with the expected and anticipated direction. Negative Affect from the PANAS had a significant negative correlation with the Vigor-Activity mood scale from the POMS. Statistically significant, positive correlations were found among NA and the following negative mood subscales: Tension-Anxiety, Depression-Dejection, Anger-Hostility, Fatigue-Inertia, Confusion-Bewilderment, and Total Mood Disturbance. The positive affect scale was related negatively and moderately to the following POMS scales: Depression-Dejection, Fatigue-Inertia, Confusion-Bewilderment, and Total Mood Disturbance. PA and the Vigor-Activity subscale of the POMS had a statistically significant, positive correlation. Although not statistically significant, the PA scale had negative relationships with Tension-Anxiety and Anger-Hostility.

Discussion

This study was the first to measure the effect of affect on dyspnea intensity and test the concurrent validity of the POMS and PANAS in patients with COPD. The findings demonstrated that the age, gender, disease severity, mood and affect predicted 39.6 % of the variance in intensity of dyspnea experienced by COPD patients, during activities of daily living. Specifically, gender, disease severity, positive affect, anxiety, and fatigue individually contributed to the intensity of dyspnea. Overall, the POMS and the PANAS demonstrated low to moderate concurrent validity.

Primary Aim: Regression Model with Predictor Variables

In several studies dyspnea, fatigue and anxiety were found to be the most prevalent symptoms experienced by COPD patients.[5,25,32] In this sample anxiety and fatigue contributed significantly to the intensity of dyspnea with activities. These relationships between anxiety and dyspnea, and fatigue and dyspnea are supported by prior studies. Specifically, the relationship between anxiety and dyspnea has been found in pulmonary patients.[25,26,33] Similarly, Gift[34] found a moderate relationship between dyspnea and fatigue in patients with COPD.

The intensity of activity-related dyspnea and FEV_1 percent predicted demonstrated a significant but weak negative relationship. Using the same measure of dyspnea, Eakin and colleagues found similar negative correlations between dyspnea and disease severity measures of FEV_1 and FVC percent predicted.[31] Other research studies have demonstrated a similar weak to moderate, negative correlation between dyspnea and FEV_1.[15,35,36] The majority of literature cites a modest relationship between lung function (FEV_1) and reported dyspnea ($r = .40$-$.50$).[37] The subjects in this sample reported less dyspnea intensity than those subjects in the SOBQ validation study conducted by Eakin, Resnikoff, Prewitt, Reis, and Kaplan.[31] Although both samples included moderate to severe COPD patients, the validation sample had a slightly lower FEV_1% predicted values (30% pred.) than this study's sample (45 % pred.).[31] Therefore, the lower dyspnea intensity scores in this sample may be expected as a result of the higher FEV_1% predicted values. There is limited normative data in the literature, because the SOBQ was recently modified from an older version to measure intensity versus frequency of dyspnea.[31]

One unexpected result was the positive relationship between positive affect and intensity of dyspnea with activities. Generally, social interactions and activities have been highly correlated to positive affect, which is characterized by well-being and extraversion.[23] The majority of studies conclude that positive affect remains unrelated to symptom reporting.[23] Watson and Pennebaker performed a comprehensive review of four large subject samples that investigated the relationship between health complaints and affectivity.[11] In this review, positive affect although largely unrelated to health complaints had weak but significant correlations with the Somatization Scale of the Hopkins Symptom Check List (r = -.28) and the PILL (r = .19).[38] Watson and Pennebaker noted that this was a striking result and suggested that individuals with numerous health complaints could simultaneously lead happy and active lives.[11] It is possible that these subjects with pulmonary disease had higher positive affectivity and increased social activity, and thus experience more severe dyspnea. Conversely in this study, negative affectivity demonstrated no significant contribution to the intensity of dyspnea. This study's findings contradict prior studies that have shown negative affect to be moderately correlated with physical symptoms and complaints.[11] It is important to note that in this study, the intensity of dyspnea was measured versus the frequency of occurrence of symptoms, as in other studies. To this author's knowledge, this is the first time the PANAS was used to measure affectivity in COPD patients, as related to the intensity of dyspnea.

Gender was a significant predictor of reported dyspnea intensity with activity. Although women had less severe disease than men (>FEV_1 % pred.), they reported the same intensity of dyspnea with activities as men. These findings agree with prior studies that have reported that women have higher levels of dyspnea than men, despite lower disease severities.[5,35] The gender differences in reported dyspnea remains controversial. Gift[34] found no difference in reported frequency, severity or distress of dyspnea between men and women with COPD. The reason for the contradictory findings may be a lack of consistency in the measurement of symptoms. Some authors have used measures of intensity or frequency of dyspnea with exercise or activities of daily living, while others have used general measures of symptom reporting. Although this study's findings suggest women report greater intensity of dyspnea, the level of activity for which men and women were reporting dyspnea was not measured in this study. Women in this sample maybe more active in their role than men, and thus have more dyspnea.

Vigor, negative affect, confusion, depression, anger, and age were not significant predictors of the intensity of dyspnea with activity. It has been suggested that older adults report lower levels of dyspnea than younger patients.[9] Although negatively correlated, age was not significant predictor of dyspnea in this study. Surprisingly, depression and negative affect had no significant influence on dyspnea. This was an unexpected finding. Prior research has demonstrated a significant relationship among depression, negative mood and dyspnea.[26,39-41] Dyspnea may not be moderated by negative mood, but possibly other factors, such as steroids, which have been implicated in causing higher rates of depression in COPD patients.[42] Graydon and Ross[32] found that negative mood was not a predictor of symptoms, but that symptoms were actually a predictor of negative mood. In the same study, negative mood was a predictor of functioning in COPD patients.[32] Lastly, anger, vigor and confusion were not significant contributors to the intensity of dyspnea in this COPD population. Others have shown that anger and cognitive disturbances are associated with more frequent respiratory symptoms.[43] Once again this may be due to the measurement of intensity of dyspnea versus the frequency of dyspnea. Vigor had a significant negative relationship to fatigue, which was a significant contributor to the intensity of dyspnea. It appears that vigor does not impact the intensity of activity-related dyspnea in this COPD sample.

Secondary Aim: Concurrent Validity of POMS & PANAS

Although the PANAS and the POMS have been extensively compared with other mood instruments, this is the first attempt to establish the concurrent validity between the two instruments utilizing COPD patients. Overall, the PANAS instrument demonstrated low to moderate concurrent validity with the POMS subscales and total mood disturbance scores. The one exception was the nonsignificant relationships between positive affect and two POMS subscales, anger-hostility and tension-anxiety. Affect and mood, as measured by the PANAS and the POMS, appear to contain mutual but also exclusive variables. According to the literature, affect and mood although separate phenomenon, are closely intertwined components of emotion.[21] This study and previous literature suggests that affect has a distinctive contribution to symptom reporting.[11,12,23] Additional research is needed to establish the long term contribution of affect on dyspnea in the COPD population. Also, more extensive methodological studies are needed to establish validity and reliability, and normative data for the PANAS and POMS in the COPD population.

At an individual level, the sample of COPD patients in this study scored similarly in positive affect and lower in negative affect than the undergraduate students and employees used for establishing normative scores.[23] The scores in this sample compared well to that of Kercher who found that the average mean scores among the elderly for PA and NA were similar and/or lower than that of college students.[24] The female COPD patients scored low levels of anxiety, anger, vigor, depression and confusion and higher levels of fatigue. The male COPD patients in this study had low levels of anxiety, depression, anger, and vigor but high confusion and fatigue scores. The POMS has been used extensively throughout the literature for various populations. The majority of COPD studies have utilized the long version of the POMS, which consists of 65 adjectives. This made it difficult to compare normative scores for COPD patients in this study. Normative data for the short POMS form was established in college students, and psychiatric outpatient samples.[30]

Limitations

This study's generalizability is limited due to the use of a convenience sample and cross-sectional design. A segment of the COPD population may have been underrepresented or overrepresented in this study, as evidenced by the majority of Caucasians and the small proportion of minorities. Also, important to note is that these subjects volunteered for a rigorous exercise and educational clinical trial, which required multiple visits over a year. This motivated sample may not represent the COPD population as a whole but as a subset. Although, the use of a convenience sample did provide a cost-effective means of conducting this research. Another limitation of the study was the retrospective, self-reporting instruments used for data collection. Data accuracy may be improved with measurement of activity-related dyspnea within a controlled laboratory setting. Lastly, the cross-sectional study design only recovers a snapshot of the variables at one point in time. A stronger longitudinal design for future research is recommended to measure the impact of these variables over time.

Conclusions

In summary, dyspnea is a complex, multifaceted and multidimensional phenomenon that includes physiologic and psychologic components. Specifically, gender, fatigue, anxiety, positive affect and disease severity significantly affect the intensity of dyspnea with activities experienced by COPD patients. Educational and treatment modalities to reduce dyspnea and disability in COPD patients should be individualized, keeping in mind possible gender differences. Psychological assessment techniques and interventions also should be integrated into the assessment, treatment and management of pulmonary disease with the goal of reducing disability in this COPD population. Additional research is needed to further investigate the impact of gender, disease severity, affect and mood on activity-related dyspnea. In addition, research is needed to investigate the relationship between affect and dyspnea longitudinally, and possible interventions that could modify mood and affect to reduce the intensity of dyspnea and disability in COPD patients.

Figure 1.
SYMPTOM PERCEPTION MODEL [8]

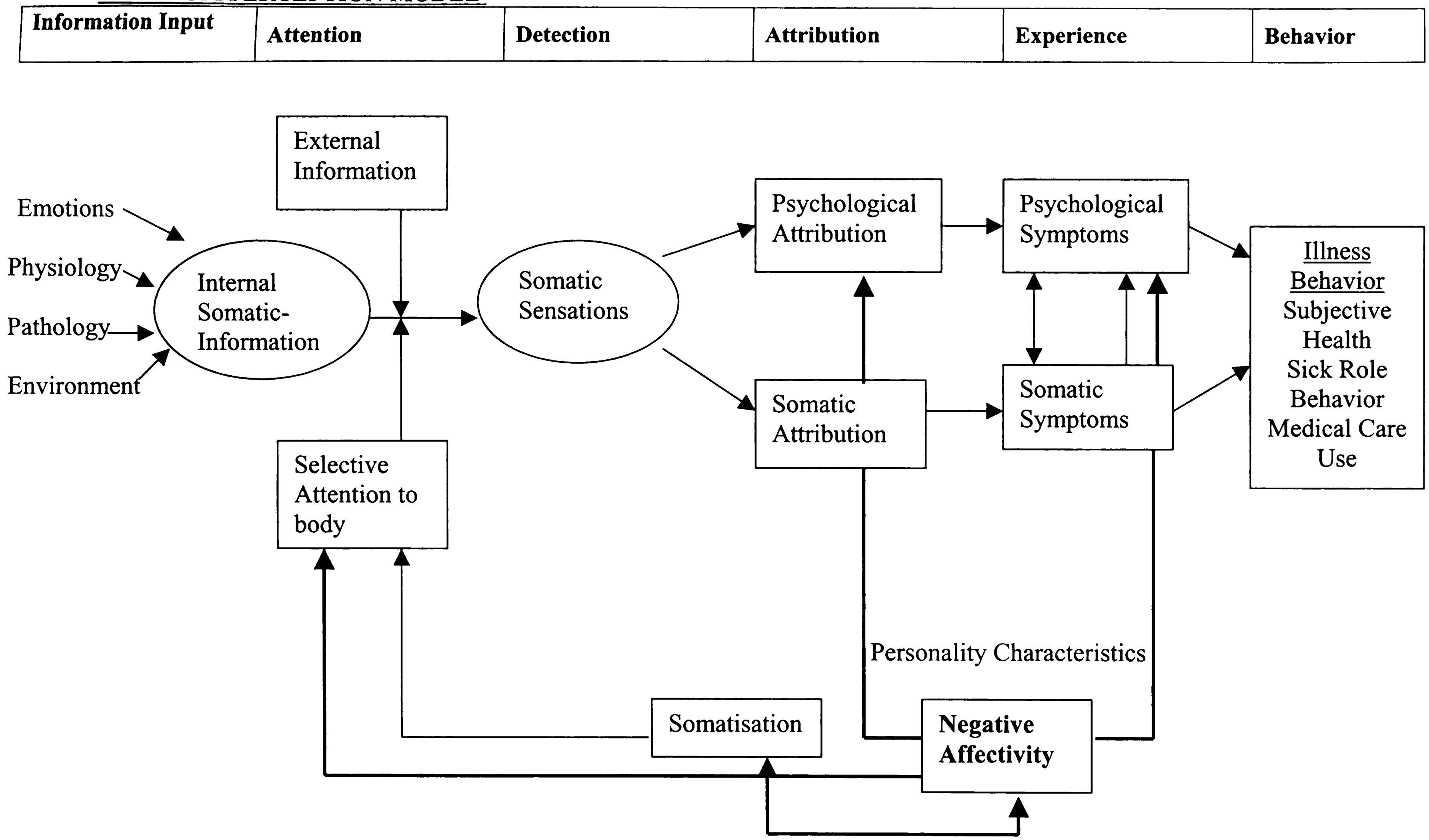


Table 1

CONCEPT	VARIABLES	INSTRUMENT
Affect	Positive Affect: interested, excited, strong, enthusiastic, proud, alert, inspired, determined, attentive, and active Negative Affect: distressed, upset, guilty, scared, hostile, irritable, ashamed, nervous, jittery and afraid	PANAS
Mood	Total Mood Disturbance Score (TMD) 6 Subscales: Tension-Anxiety (TA), Depression-Dejection (DD), Anger-Hostility (AH), Vigor-Activity (VA), Fatigue-Inertia (FI), and Confusion-Bewilderment (CB).	POMS
Dyspnea with ADLs	21 different activities of daily living at varying levels of exertion	SOBQ
COPD Severity	Baseline: FEV_1, FEV_1% predicted, FVC FEV_1/FVC Post-dilator: FEV_1, FEV_1% predicted, FVC FEV_1/FVC	Spirometry

Table 2

Means, Standard Deviations & Gender Differences of Age, Disease Severity, Intensity of Dyspnea, Affect and Mood (N = 115)

	Total Sample mean(SD)	Females mean(SD)	Males mean(SD)	F vs. M t-test p-values
Gender n (%)		62(54%)	53(46%)	
Age in years	65.56(8.25)	65.63(8.13)	65.47(8.45)	.919
FEV_1 % predicted	44.67(14.54)	48.34(13.97)	40.38(14.14)	.003 [b]
$FEV_1/FVC\%$	41.88(11.43)	42.88(9.16)	40.69(13.65)	.309
Activity-related dyspnea (0-120)[a]	53.71(17.52)	56.15(14.75)	50.86(20.07)	.107
Positive Affect (10-50)[a]	33.31(7.65)	33.65(7.48)	32.92(7.9)	.613
Negative Affect (10-50)[a]	16.03(5.81)	16.51(6.24)	15.45(5.26)	.331
Tension-Anxiety (0-20)[a]	4.63(3.17)	4.55(3.14)	4.72(3.22)	.777
Depression-Dejection (0-20)[a]	3.29(3.35)	3.01(2.61)	3.62(4.05)	.333
Anger-Hostility (0-20)[a]	3.20(3.32)	3.29(3.34)	3.09(3.34)	.759
Vigor-Activity (0-20)[a]	7.44(4.59)	7.58(4.54)	7.28(4.68)	.730
Fatigue-Inertia (0-20)[a]	7.30(5.01)	7.71(5.04)	6.83(4.99)	.351
Confusion-Bewilderment (0-20)[a]	.313(2.70)	.177 (2.53)	.472(2.89)	.562
Total Mood Disturbance (-20-100)[a]	11.29(15.63)	11.15(14.45)	11.45(17.05)	.919

a. Range of possible values.
b. Significant at p < .05.

Table 3

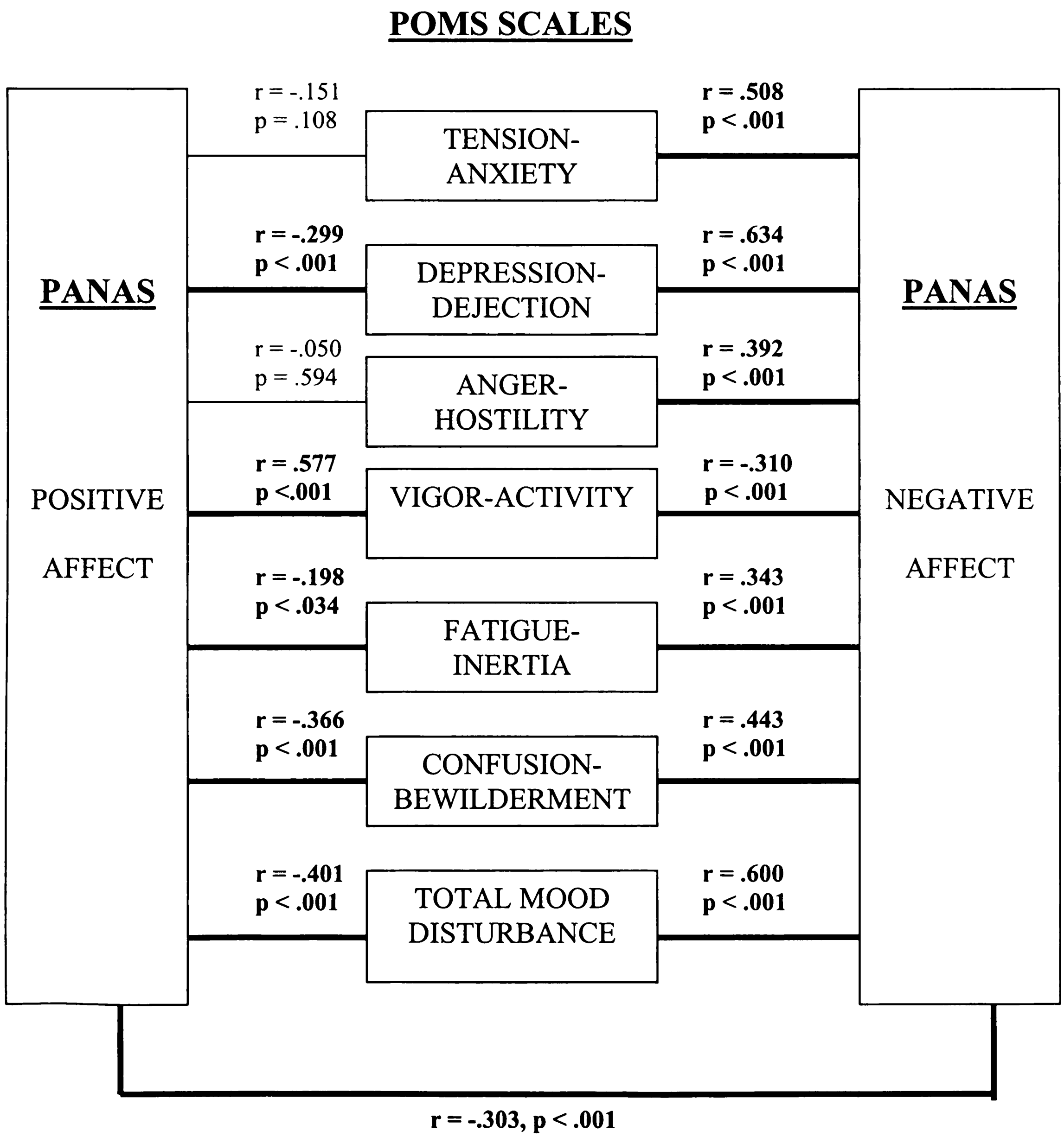
Simultaneous Multiple Regression of Activity-Related Dyspnea Predicted by 11 Variables (N = 115).

	Independent Variables	Standardized Coefficients Beta	R^2-Change (sr^2)	F	p-value
1	Tension-Anxiety	.293	.052	2.96	.004*
2	FEV_1 % predicted	-.288	.059	-3.16	.002*
3	Fatigue- Inertia	.288	.050	2.93	.004*
4	Positive Affect	.242	.036	2.46	.015*
5	Gender (F=1, M=2)	-.232	.045	-2.77	.007*
6	Vigor-Activity	-.159	.012	-1.44	.154
7	Negative Affect	-.149	.011	-1.37	.175
8	Confusion-Bewilderment	.089	.049	.911	.365
9	Depression-Dejection	.065	.002	.549	.584
10	Anger- Hostility	-.057	.002	-.602	.548
11	Age in years	-.046	.0014	-.493	.623
	Total		.396	6.15	.0001

* p < .05.

Figure 2

Concurrent Validity between Affect (PANAS) and Mood (POMS)



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