Published in final edited form as:
J Psychosom Res. 2013 May ; 74(5): 450–453. doi:10.1016/j.jpsychores.2013.02.001.

The Prospective Association of Perceived Criticism with Dyspnea in Chronic Lung Disease

Kristen E. Holm, PhD, MPH[1,2], **Frederick S. Wamboldt, MD**[1,3], **Dee W. Ford, MD, MSCR**[4], **Robert A. Sandhaus, MD, PhD**[1,5], **Matthew J. Strand, PhD**[6,7], **Charlie Strange, MD**[4], and **Karin F. Hoth, PhD**[1,3,8]

[1]National Jewish Health, Department of Medicine, Denver, CO, United States

[2]Colorado School of Public Health, Department of Community and Behavioral Health, Aurora, CO, United States

[3]University of Colorado School of Medicine at the Anschutz Medical Campus, Department of Psychiatry, Aurora, CO, United States

[4]Medical University of South Carolina, Division of Pulmonary and Critical Care Medicine, Charleston, SC, United States

[5]Clinical Director, Alpha-1 Foundation, Miami, FL, United States

[6]National Jewish Health, Division of Biostatistics and Bioinformatics, Denver, CO, United States

[7]Colorado School of Public Health, Department of Biostatistics, Aurora, CO, United States

[8]University of Colorado School of Medicine at the Anschutz Medical Campus, Department of Neurology, Aurora, CO, United States

Abstract

Objective—Perceived criticism from family members influences mental health. The link between perceived criticism and physical health has not been thoroughly investigated. The objective of this study was to examine the association of perceived criticism with dyspnea in chronic obstructive pulmonary disease (COPD).

Methods—401 individuals with alpha-1 antitrypsin deficiency-associated COPD completed questionnaires at baseline, 1- and 2-year follow-up. Perceived criticism at baseline was examined as a predictor of dyspnea at all three time points using a linear mixed model that adjusted for demographic and health characteristics.

Results—There was an interaction between perceived criticism and psychological distress ($p = 0.038$). Perceived criticism was associated with dyspnea only among individuals with elevated psychological distress ($b = 0.32$, $SE = 0.13$, $p = 0.018$).

Correspondence should be addressed to Kristen Holm at National Jewish Health, 1400 Jackson Street, Denver, CO 80206. holmk@njhealth.org. Phone: 303-398-1509. Fax: 303-270-2115.

Conflict of Interest Statement
The remaining authors have no conflicts of interest to disclose.

Conclusion—Further research is needed to replicate these findings and determine the extent to which they apply to other common subjective physical symptoms such as pain.

Keywords

Alpha-1 antitrypsin deficiency (AATD); Chronic obstructive pulmonary disease (COPD); Dyspnea; Perceived criticism; Psychological distress

Introduction

Perceived criticism (PC) is the extent to which an individual experiences specific intimate others as being critical of him or her. PC from family members predicts treatment response and relapse among individuals with depression and anxiety [1–4]. In addition, individuals with a history of depression show different patterns of brain activation in response to criticism than individuals with no history of depression [5, 6]. The link between PC and physical health has not been thoroughly investigated. Cross-sectional studies have found an association between higher PC and worse self-rated physical health among primary care patients [7–9]. No research has prospectively investigated PC as a predictor of dyspnea, a common symptom in medical illness and the primary symptom of chronic obstructive pulmonary disease (COPD).

COPD is the 3rd leading cause of death in the US [10]. It is an incurable disease with a high prevalence of co-morbid depression and anxiety [11]. A fundamental goal of treatment is to reduce dyspnea, which is “a subjective experience of breathing discomfort that….derives from interactions among multiple physiological, psychological, social, and environmental factors” [12, page 322]. Psychological distress is associated with dyspnea among COPD patients [13–16]. PC may also be associated with dyspnea. Consistent with a diathesis-stress perspective [17], there is likely an interactive effect of psychological distress and PC.

The current study examined the association of PC with dyspnea over a two year period among patients with alpha-1 antitrypsin deficiency (AATD) associated COPD. Patients with AATD-associated COPD are clinically similar to patients with non-AATD COPD except they may be younger when they develop COPD and a subset has an additional treatment option (i.e., augmentation therapy). It was hypothesized that psychological distress would moderate the association of PC with dyspnea. PC was expected to have a stronger association with dyspnea among individuals with elevated psychological distress (compared to individuals without distress).

Method

Participants and Procedures

The protocol was approved by the National Jewish Health and Medical University of South Carolina IRBs. Data were collected via de-identified questionnaires mailed to adult members of the Alpha-1 Foundation Research Registry with physician-diagnosed COPD. This study was granted a waiver of informed consent. The overarching aim of the study was to examine social and perceptual factors that affect adjustment in AATD-associated COPD.

Baseline questionnaires were mailed to 1727 people and returned by 621. Follow-up data were collected each year for two years. Individuals were excluded as follows: indicated no COPD (n = 22), death (n = 27), lung transplant prior to (n = 33) or during the study (n = 7), returned only baseline questionnaire (n = 62), and missing data (n = 69). Included individuals (n = 401) had complete data for all predictors and dyspnea ratings at ≥ 2 time points.

Measures

Perceived Criticism (PC)—PC was measured at baseline by the criticism subscale of the Family Emotional Involvement and Criticism Scale (FEICS) and the Perceived Criticism Measure (PCM). For both measures, a higher score indicates more criticism. Scores for the criticism subscale of the FEICS range from 7 to 35 [18]. Cronbach's alpha was .76 in this sample. The PCM is a single item that measures, on a scale from 1 to 10, the extent to which the respondent views family members as being critical [3]. All respondents indicated how critical their family was of them (PCM-FAM) and individuals who were coupled also indicated how critical their spouse/partner was of them (PCM-SP).

A dichotomous composite score for PC was created. Since cutoff scores for high PC have not been established, the mean scores in this sample were used to demarcate low versus high PC. When all measures of PC were below the mean, the composite score reflected low PC. If any measure of PC was above the mean, the composite score reflected high PC. For individuals who were single, two measures of PC were used for the composite score. For individuals who were coupled, all three measures were used.

Psychological Distress—Symptoms of depression and anxiety were measured at baseline by the Hospital Anxiety and Depression Scale (HADS) [19]. Subscales for depression and anxiety range from 0 to 21, with higher scores indicating more symptoms. Cronbach's alpha was .79 for depression and .85 for anxiety. Scoring bands for both subscales specify that a score of ≥ 8 indicates elevated distress. A dichotomous composite score was calculated. Individuals in the normal range on both subscales were coded as not distressed and individuals in the elevated range on one or both subscales were coded as having elevated psychological distress.

Dyspnea—Dyspnea was measured annually by the Modified Medical Research Council Dyspnea Scale (MMRC), a single-item 5-point grading scale. A higher score indicates more dyspnea [20].

Data Analysis

The hypothesis was tested using a linear mixed model (PROC MIXED) in SAS 9.3, which accounts for the correlation within participants over time. Several combinations of random effects for subjects and error covariance structures were compared using the Akaike Information Criterion (AIC). The best fit used a random intercept for subjects and simple (independent) error covariance structure (yielding a compound symmetric covariance structure for responses within a subject). This model allows for estimation of between-subject variance through the random intercept term, and within-subject variance through the residual variance term. Restricted maximum likelihood estimation was used. Significance tests were two-sided with a significance level of 0.05.

The model included the composite variables for PC and distress, and the interaction of PC × distress. The model included as covariates the demographic and health characteristics listed in Table I and a fixed effect for time.

Results

Individuals with COPD who were excluded from analyses were compared to those included. The groups did not differ with regard to age, gender, relationship status, education, tobacco exposure, oxygen use, augmentation use, PC, or dyspnea ($p > 0.05$). However, the percentage of individuals with elevated psychological distress was higher in the group that was excluded ($\chi^2_{(df=1)} = 5.58$, $p = 0.018$).

The sample is described in Table I. Mean (SD) scores on the measures of PC were: FEICS = 10.3 (4.4), PCM-FAM = 2.6 (2.4), PCM-SP = 2.9 (2.6). The means and standard deviations for dyspnea were stable at all three time points: 2.9 (SD = 1.1).

The interaction between PC and psychological distress was statistically significant ($p = 0.038$, see Table II). PC was not associated with dyspnea among individuals without elevated distress ($p = 0.753$). In contrast, PC was associated with more dyspnea among individuals with elevated distress ($b = 0.32$, $SE = 0.13$, $p = 0.018$).

Discussion

PC from family members is associated with dyspnea over a two-year period among individuals with AATD-associated COPD who have elevated psychological distress. The link between PC and dyspnea may be due to a shared neural mechanism that is involved with both the perception of criticism and the perception of dyspnea. Individuals with a history of major depression, even when fully remitted, have a different pattern of brain activation in response to critical remarks from family members than individuals who have never had depression. Specifically, they show increased activation in the amygdala and decreased activation in the anterior cingulate cortex and dorsolateral prefrontal cortex [5, 6], suggesting an altered corticolimbic response to criticism. The amygdala, anterior cingulate cortex, and prefrontal cortex are also involved in the perception of dyspnea [21, 22].

From a psychological perspective, findings suggest that negative aspects of the social environment have greater impact on individuals with elevated distress. This is consistent with the diathesis-stress perspective outlined by Hooley and Gotlib in which critical comments are the stressor, and the diathesis (i.e., vulnerability) is that individuals with elevated psychological distress have an information-processing style characterized by a tendency to be more attentive or attach more meaning to negative aspects of the social environment such as criticism [17].

Dyspnea is a prevalent symptom in many chronic illnesses, including cancer, heart disease, and renal failure [23, 24]. Future research should continue to examine the association of PC with dyspnea to determine the extent to which these findings are replicable. If these findings are replicated, PC could be a target for intervention. PC may also be associated with pain. The neural mechanisms involved in the perception of pain overlap with those for the perception of dyspnea [25].

Limitations of the current study must be considered. Objective measures of COPD severity were not included; however, oxygen use was included in analyses as a proxy of disease severity. Many individuals did not respond to the original questionnaire, and respondents may not represent the population of individuals with AATD-associated COPD. Further, respondents with psychological distress were more likely to be excluded from the sample. Finally, it was not possible to use normative cutoff scores for low versus high PC since thresholds have not been established.

The current study also has strengths. Dyspnea was measured over a two-year period using a well-established measure. The most frequently used measures of PC were also utilized. Findings extend research on factors that influence the perception of dyspnea, a debilitating symptom in several medical illnesses.

Acknowledgments

We thank Rebecca McClure, MLIS and Laura Schwarz for their help recruiting participants for this study. This work was supported by a Postdoctoral Research Fellowship Grant from the Alpha-1 Foundation. Research reported

in this publication was also supported by the National Institutes of Health (grants F32 HL083687, K23 HL091049, and K23 HL095658) and the Colorado Clinical Translational Science Award grant UL1 TR000154 from NIH/NCATS. The funding sources had no role in the design, analysis, interpretation, or presentation of the results.

Dr. Sandhaus is the Clinical Director of the Alpha-1 Foundation, which provided some of the funding for the research described in this manuscript. Dr. Strange has research grants, consultancies, and speakers bureau disclosures related to COPD, Alpha-1 Antitrypsin Deficiency, and other pulmonary diseases that do not influence the content of this manuscript.

References

1. Chambless DL, Steketee G. Expressed emotion and behavior therapy outcome: a prospective study with obsessive-compulsive and agoraphobic outpatients. J Consult Clin Psychol. 1999; 67:658–665. [PubMed: 10535232]
2. Renshaw KD, Chambless DL, Steketee G. Perceived criticism predicts severity of anxiety symptoms after behavioral treatment in patients with obsessive-compulsive disorder and panic disorder with agoraphobia. J Clin Psychol. 2003; 59:411–421. [PubMed: 12652634]
3. Hooley JM, Teasdale JD. Predictors of relapse in unipolar depressives: expressed emotion, marital distress, and perceived criticism. J Abnorm Psychol. 1989; 98:229–235. [PubMed: 2768657]
4. Kwon JH, Lee Y, Lee MS, Bifulco A. Perceived criticism, marital interaction and relapse in unipolar depression--findings from a Korean sample. Clin Psychol Psychother. 2006; 13:306–312.
5. Hooley JM, Gruber SA, Parker HA, Guillaumot J, Rogowska J, Yurgelin-Todd DA. Cortico-limbic response to personally challenging emotional stimuli after complete recovery from depression. Psychiatry Res. 2009; 172:83–91. [PubMed: 19452633]
6. Hooley JM, Gruber SA, Scott LA, Hiller JB, Yurgelun-Todd DA. Activation in dorsolateral prefrontal cortex in response to maternal criticism and praise in recovered depressed and healthy control participants. Biol Psychiatry. 2005; 57:809–812. [PubMed: 15820239]
7. Shields CG, Franks P, Harp JJ, Campbell TL, McDaniel SH. Family Emotional Involvement and Criticism Scale (FEICS): II. Reliability and validity studies. Fam Syst Med. 1994; 12:361–377.
8. Fiscella K, Franks P, Shields CG. Perceived family criticism and primary care utilization: psychosocial and biomedical pathways. Fam Process. 1997; 36:25–41. [PubMed: 9189751]
9. Fiscella K, Campbell TL. Association of perceived family criticism with health behaviors. J Fam Pract. 1999; 48:128–134. [PubMed: 10037544]
10. Kochanek KD, Xu J, Murphy SL, Minino AM, Kung HC. Deaths: preliminary data for 2009. Natl Vital Stat Rep. 2011; 59:1–51. [PubMed: 22808755]
11. Yohannes AM, Willgoss TG, Baldwin RC, Connolly MJ. Depression and anxiety in chronic heart failure and chronic obstructive pulmonary disease: prevalence, relevance, clinical implications and management principles. Int J Geriatr Psychiatry. 2010; 25:1209–1221. [PubMed: 20033905]
12. American Thoracic Society. Dyspnea. Mechanisms, assessment, and management: a consensus statement. Am J Respir Crit Care Med. 1999; 159:321–340. [PubMed: 9872857]
13. de Voogd JN, Sanderman R, Postema K, van Sonderen E, Wempe JB. Relationship between anxiety and dyspnea on exertion in patients with chronic obstructive pulmonary disease. Anxiety Stress Coping. 2011; 24:439–449. [PubMed: 20936544]
14. Kapella MC, Larson JL, Patel MK, Covey MK, Berry JK. Subjective fatigue, influencing variables, and consequences in chronic obstructive pulmonary disease. Nurs Res. 2006; 55:10–17. [PubMed: 16439924]
15. von Leupoldt A, Taube K, Lehmann K, Fritzsche A, Magnussen H. The impact of anxiety and depression on outcomes of pulmonary rehabilitation in patients with COPD. Chest. 2011; 140:730–736. [PubMed: 21454397]
16. Yeh ML, Chen HH, Liao YC, Liao WY. Testing the functional status model in patients with chronic obstructive pulmonary disease. J Adv Nurs. 2004; 48:342–350. [PubMed: 15500528]
17. Hooley JM, Gotlib IH. A diathesis-stress conceptualization of expressed emotion and clinical outcome. Applied & Preventive Psychology. 2000; 9:135–151.

18. Shields CG, Franks P, Harp JJ, McDaniel SH, Campbell TL. Development of the Family Emotional Involvement and Criticism Scale (FEICS): a self-report scale to measure expressed emotion. J Marital Fam Ther. 1992; 18:395–407.

19. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatr Scand. 1983; 67:361–370. [PubMed: 6880820]

20. Fletcher CM, Elmes PC, Fairbairn AS, Wood CH. The significance of respiratory symptoms and the diagnosis of chronic bronchitis in a working population. Br Med J. 1959; 5147:257–266. [PubMed: 13823475]

21. von Leupoldt A, Dahme B. Cortical substrates for the perception of dyspnea. Chest. 2005; 128:345–354. [PubMed: 16002956]

22. von Leupoldt A, Dahme B. Psychological aspects in the perception of dyspnea in obstructive pulmonary diseases. Respir Med. 2007; 101:411–422. [PubMed: 16899357]

23. Spector N, Connolly MA, Carlson KK. Dyspnea: applying research to bedside practice. AACN Adv Crit Care. 2007; 18:45–58. [PubMed: 17284947]

24. Solano JP, Gomes B, Higginson IJ. A comparison of symptom prevalence in far advanced cancer, AIDS, heart disease, chronic obstructive pulmonary disease and renal disease. J Pain Symptom Manage. 2006; 31:58–69. [PubMed: 16442483]

25. von Leupoldt A, Sommer T, Kegat S, Baumann HJ, Klose H, Dahme B, et al. Dyspnea and pain share emotion-related brain network. Neuroimage. 2009; 48:200–206. [PubMed: 19527787]

Table I

Characteristics of the Sample at Baseline (N=401)

Variable	M (SD)
Age (years)	59.7 (9.4)
Length of time since COPD was diagnosed (years)	11.9 (7.6)
Variable	**N (%)**
Gender (% male)	201 (50.1)
Relationship Status	
Single (divorced/separated, widowed, never married)	88 (21.9)
Coupled (married, member of an unmarried couple)	313 (78.1)
Highest Level of Education Completed	
Grade 12 or less	119 (29.7)
College 1 to 3 years	147 (36.7)
College graduate or more	135 (33.7)
Lifetime Tobacco Exposure[a]	
Never smoked	129 (32.2)
1 to 20 pack years	149 (37.2)
More than 20 pack years	123 (30.7)
Genotype[b]	
Severely deficient (ZZ, SZ, FZ, P-Null, Z-Null, ZPlowell, ZMmalton, ZMheerlen)	336 (83.8)
Not severely deficient (MZ, MS, M-Null, SS)	31 (7.7)
Unknown	34 (8.5)
Oxygen Use	204 (50.9)
Augmentation Therapy Use	311 (77.6)
Perceived Criticism	
Low	195 (48.6)
High	206 (51.4)
Psychological Distress	
Not elevated distress	234 (58.4)
Elevated distress	167 (41.6)

[a]Pack years = (average # of cigarette packs smoked per day) × (# of years smoked)

[b]ZZ and SZ are the most commonly identified severely deficient genotypes. MZ and MS are the most commonly identified genotypes with a single abnormal gene for AATD.

Individuals with a single abnormal gene are often referred to as carriers.

Table II

Association of Perceived Criticism with Dyspnea

Predictors	b (SE), p
Interaction Perceived Criticism × Psychological Distress	Overall p = 0.038
Effect of perceived criticism if not elevated distress	−0.03 (0.11), 0.753
Effect of perceived criticism if elevated distress	0.32 (0.13), 0.018
Perceived Criticism (low)[a,b]	0.14 (0.09), 0.106
Psychological Distress (not elevated)[a,c]	0.42 (0.09), <0.001
Age	−0.002 (0.005), 0.690
Number of Years Since COPD was Diagnosed	0.03 (0.01), <0.001
Gender (male)[a]	0.005 (0.09), 0.957
Relationship Status (single)[a]	−0.07 (0.10), 0.504
Education (college graduate or more)[a]	Overall p = 0.011
Grade 12 or less	0.29 (0.11), 0.006
College 1 to 3 years	0.25 (0.10), 0.014
Lifetime Tobacco Exposure (never smoked)[a]	Overall p = 0.373
1 to 20 pack years	0.10 (0.11), 0.326
More than 20 pack years	0.15 (0.11), 0.166
Genotype (severely deficient)[a]	Overall p = 0.094
Not severely deficient	−0.09 (0.18), 0.600
Unknown	0.30 (0.15), 0.049
Oxygen Use (no)[a]	0.81 (0.09), <0.001
Augmentation Therapy Use (no)[a]	−0.09 (0.12), 0.443
Time (2-year follow-up)[a]	Overall p = 0.550
Baseline	−0.03 (0.04), 0.445
1-year follow-up	−0.05 (0.05), 0.286

[a]For categorical variables, reference group is listed in parentheses

[b]Effect of perceived criticism, unweighted average over both levels of psychological distress

[c]Effect of psychological distress, unweighted average over both levels of perceived criticism