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Personality Effect on Quality of Life in Chronic Obstructive Pulmonary Disease

Aaron McColpin*

Department of Nursing, California State University, Channel Islands, Camarillo, CA, USA

*Corresponding author: Aaron McColpin, Department of Nursing, California State University, Channel Islands, Camarillo, CA, USA, Tel: 1-805-377-2471; E-mail: aaron.mccolpin@csuci.edu

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Abstract

Background: The purpose of this study was to examine the relationship between personality characteristics and the effect of disease acceptance on the Health-Related Quality of Life (HRQOL) in those with Chronic Obstructive Pulmonary Disease (COPD). This study attempts to identify non-pharmacological ways to improve overall wellbeing of those with chronic diseases.

Methods: The study included a quantitative correlational research design to examine this relationship by using self-reporting questionnaires and functional data. This study design helped to correlate the effect of personality type and disease acceptance on the HRQOL.

Results: The study included 39 participants referred for pulmonary rehabilitation. The median age of the study participants was 74 years old. Of the participants, 56% (n=22) were male and 44% (n=17) were female. The median pack years smoked for participants was 40 pack years. The median years since disease diagnosis was 11 years. The mean FEV1% was 43% of predicted based upon age, gender and ethnicity. The study found that there was a significant negative correlation between HRQOL and disease acceptance, $r=-0.42$, $p=0.008$. There was a significant negative correlation between HRQOL and neurosis, $r=-4.3$, $p=0.007$. The study analysis found a statistically significant negative correlation between neurosis and disease acceptance, $r=-4.3$, $p=0.007$. The study found that neurosis did mediate the relationship between HRQOL and disease acceptance. The analysis found that using a Spearman and Pearson correlation shows significance between the dependent variable HRQOL and the independent variables neurosis, $r=-0.428$, $p=0.008$, and disease acceptance, $r=0.416$, $p=0.007$.

Conclusion: A broad range of factors determines health-related quality of life in those with chronic respiratory disease. This study did find a correlation between personality characteristics affecting quality of life in those with COPD.

Keywords: Health-Related Quality of Life; Chronic obstructive pulmonary disease; Personality types pulmonary

Introduction

COPD is defined by GOLD commonly known as “a common preventable and treatable disease, is characterized by persistent airflow limitation that is usually progressive and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases” [1-3]. This change of definition was changed from previous definitions an attempt to focus on treatment and a patient centered approach. COPD is preventable but not curable and even with optimum care the symptoms become more advanced over time [4,5].

Personality characteristics/types are emerging as risk factors for certain diseases. However, little is known about personality/behavior types and whether or not they are predictors of Health Related Quality of Life (HRQOL) status in patients with Chronic Obstructive Pulmonary Disease (COPD), or their effect on disease treatments. Further research is needed to determine if personality type, personality characteristics, or disease acceptance influences the patient's perception of their HRQOL in COPD patients. The Global Initiative for COPD recommended an optimal treatment plan for COPD patients is to begin with patient education.

Purpose of the Study

The purpose of this study was to examine any existing association between the personality type of Neuroticism and disease acceptance effect on the Health-Related Quality of Life (HRQOL) in those with Chronic Obstructive Pulmonary Disease (COPD). A quantitative correlational research design was used. Disease acceptance was measured using the Illness Cognition Questionnaire (ICQ), Neuroticism was measured using the Big Five Inventory (BFI) focusing on Neuroticism, and Health-Related Quality of Life was measured using the disease specific Clinical COPD Questionnaire (CCQ). This studies information may provide additional knowledge and allow future treatment by providers and pulmonary rehabilitation programs to

improve their patients' quality of life. The existing gap in current literature provides an opportunity for a significant study to attempt improve our understanding on one of the few diseases that is continuously growing worldwide.

Significance of Study

Health-Related Quality of Life (HRQOL) is a key indicator of those with Chronic Obstructive Pulmonary Disease (COPD). Little research has been conducted to determine the effects of Neurosis on Health-Related Quality of Life in those with COPD. Also, there is limited research looking at the issue of the personality type/characteristics of neurosis effects on disease acceptance. This study attempted to address the current knowledge gap in existing literature of the influence Neurosis on quality of life and disease acceptance in those with COPD. As medical professionals gain a greater understanding of these effects on quality of life, they may be able to develop personalized treatment plans for individuals with COPD.

Research Questions

The first research question is what is the relationship between Health-Related Quality of Life and disease acceptance? Second, what is the relationship between Health-Related Quality of Life and Neurosis? Third, what is the relationship between Neurosis and disease acceptance? Finally, does Neurosis mediate the relationship between Health-Related Quality of Life and disease acceptance?

The role of personality in disease symptoms and management gained prominence with the discovery of the type D or "distressed" personality characterized by a synthesis of negative affectivity (NA) and social inhibition (SI) and associated with poorer health outcomes. De Fruyt et al. [6] analyzed type D in relation to the Big Five personality traits. Type D personality has been confirmed by international research, primarily focused on cardiovascular disease [7], Svansdottir et al. [8], Weng et al. [9], Williams et al. [10]. Although there appears to be little research on type D personality in individuals with COPD, COPD is a prominent risk factor for severe cardiovascular disease [11]. Only one study examined personality in patients with COPD, focusing on the impact of ego defense mechanisms on HRQOL and dyspnea severity [12]. The lack of attention to the prospective role of personality in outcomes such as HRQOL and disease management in COPD may be more a reflection of the historic neglect of COPD than any notion that they may not be relevant. The following section covers the emerging presence of personality in health psychology research.

Methodology

The purpose of this study was to examine any existing association between the personality types and disease acceptance effect on the Health-Related Quality of Life (HRQOL) in those with Chronic Obstructive Pulmonary Disease (COPD). A quantitative correlational research design will be used in examining this relationship by utilizing self-reporting

questionnaires, along with functional data. This study design is to correlate the effect of the personality type and disease acceptance on the HRQOL. Personality Characteristics were measured using the Big Five Inventory (BFI), Disease Acceptance as measured using the Illness Cognition Questionnaire (ICQ) and disease specific HRQOL using the Clinical COPD Questionnaire (CCQ). This study was approved by the XXXXXX (IRB No. 14-78).

Research Design

A quantitative correlational research design using ANOVA, and multiple regressions by way of survey methodology was used to test the four hypotheses of the study. The correlation study examines the strength and type of relationship between the variables under study. The relationship between a specific personality type/characteristics and the HRQOL in those with COPD was examined from a quantitative perspective. The use of quantitative research allowed for establishing a statistical relationship between patient outcomes and the variables of the study. A quantitative correlational research design has flexibility in investigating the relationships between several variables. Typically, outcomes of this type of study have a practical application for patients and providers [13].

Study Population

The study population is those diagnosed with Chronic Obstructive Pulmonary Disease. The sample extracted from the target population, consisted of individuals diagnosed with Chronic Obstructive Pulmonary Disease who have been referred to attend a pulmonary rehabilitation program in Grants Pass, Oregon. The sample was recruited through the participating pulmonary rehabilitation program. Patients who were referred to pulmonary rehabilitation by their healthcare provider during study period were contacted to determine whether or not an eligibility criterion is met, and willingness to participate is feasible. To meet the inclusion criterion, one must be (1) diagnosed with COPD with documented pulmonary function testing as defined by the American Thoracic Society (ATS), (2) able to read and write in the English language, (3) receiving medical care from a licensed medical provider, and (4) 18 years of age or older.

Instrumentation

Clinical COPD Questionnaire (CCQ)

The Clinical COPD Questionnaire (CCQ) was developed as a disease specific practical health status instrument for those with Chronic Obstructive Pulmonary Disease (COPD) and was used to assess quality of life. The CCQ was developed from clinical status questionnaires and quality of life questionnaires. The questionnaire consists of 10 questions that ask the patient to rank their perceptions of symptoms over the past week on a 7-point scale. The 10 questions are distributed over 3 domains of symptoms, mental state, and functional state. The

questionnaire uses a 7-point scale measured on a scale of 0 to 6, with a 0 corresponding to no symptoms to a 6, which corresponds to all of the time. The higher the score on the CCQ corresponds to a lower health-related quality of life. The conciseness and simplicity of the CCQ make it very suitable for measures in clinical settings.

Illness Cognition Questionnaire (ICQ)

The Illness Cognition Questionnaire (ICQ) is a generic survey to access cognition across different chronic diseases, and was used to measure disease acceptance [14]. The questionnaire consists of 18 questions on the factors of helplessness, acceptance, and perceived benefits. The questionnaire is scored on a 4-point scale with a range of 1 to 6. The participants are asked to rank the extent of their agreement of statements with a ranking of 1 to 6, with a score of 1 reflecting disagreement to a score of 6 reflecting a complete agreement to the statement.

The Big Five Inventory

The Big Five Inventory (BFI) was developed by John et al. [15] as a short instrument to assess the five dimensions of the Five-Factor Model, and was used to examine neurosis. The BFI originally consisted of 44 short-phrase items that could be answered in less than five minutes. The newest version of the BFI questionnaire consists of ten short-phrase questions. Older and larger instruments such as the Trait Descriptive Adjective Scale (TDA) consists of 100 questions and the NEO Personality Inventory (NEO-FFI) that consists of 240 questions. Both of these questionnaires often take well over 15 minutes to complete. The US and Canadian versions of the BIF showed a high reliability on the range from 0.75 to 0.90, with a mean alpha of 0.85 [16]. The test-retest reliability ranged from 0.80 to 0.90, with a mean of 0.85. The BFI was compared to the TDA and NEO-FFF questionnaire, which are longer and were more established. The BFI had a mean convergent validity across the questionnaire of 0.75. The TDA and the BFI showed the strongest convergence with an $r=0.81$, followed by the BFI and NEO-FFI with a convergence of $r=0.73$.

Data Collection Procedure

Prior to completing the surveys, each participant was asked to read, and agree to the terms of the study detailed in the informed consent form. The informed consent form advised each participant about the purpose of the study and what their involvement consisted of prior to participation. Additionally, it was to assure participants that no identifying information will be used or collected at any point during the process and all results will remain anonymous. If a participant should disagree with the outlined terms, they would be automatically removed from the study.

The sample was recruited through a participating pulmonary rehabilitation at Three Rivers Medical Center. Once they agree to the terms of the study, a signed consent was obtain and the participants will be given a questionnaires during a rehabilitation visit or follow up visit to take the (a) Clinical

COPD Questionnaire, (b) Illness Cognition Questionnaire, (c) The Big Five Inventory, and the (d) Demographic Questionnaire. All data was collected and recorded using SPSS.

Statistical Analysis

Hypotheses one, two and three were tested using a multiply regression analysis, in an attempt to answer research questions one, two, and three. The multiply regression analysis allows a predictive model of the dependent variables from multiple independent variables within the study. Hypothesis four was tested using a meditated multiple regression, in an attempt to answer research question four. Mediated multiple regression is the hypothesized causal relationship between two variables. The intervening variable is often referred to M, indicating the mediator on the second variable. This mediates an indirect relationship between a predictor and an outcome.

Statistical Software Package for Social Sciences (SPSS) Version 22 was used during data collection. All data was checked for normal distribution, mean, and standard deviation (SD). A p value <0.05 will be considered statistically significant. Any missing values in the results were replaced using the EM algorithm in SPSS. Descriptive statistics of participants include age, gender, race, FEV1 results, smoking status which would include mean, SD and mode.

Results and Analysis

The purpose of this study was to determine an association between personality characteristic/type of neuroticism and disease acceptance on Health-Related Quality of Life (HRQOL) in patients with Chronic Obstructive Pulmonary Disease (COPD). A total of thirty-nine patients participated in the study. Hypotheses one, two, and three were tested using a correlation analysis. Hypothesis four was tested using a meditated multiple regression, in an attempt to answer research question four. Mediated multiple regression allow to determine hypothesized causal relationship between two variables.

Table 1 displays the frequency counts for selected variables. Men (56.4%) were more than women (43.6%) in the study. Most participants in the study were (79.5%) Caucasian. Thirty-one percent currently still used tobacco daily. Over half (56.4%) of the participants had an income of less than \$25,000 a year. Only 12.9% of the study participants had completed a college degree. Shortness of breath (SOB) occurred while walking on level ground for 56.4% of the sample. Almost half (46.2%) were currently married and another 20.5% were widowed. Forty-six percent of participants used oxygen daily (**Table 1**).

Table 2 displays the frequency counts for selected outcome variables. Based on FEV1 levels, 69.2% had severe or very severe COPD. Ninety percent had moderate to very good Health-Related Quality of Life and 92.3% had moderate to high levels of acceptance (**Table 2**).

Table 3 displays the descriptive statistics for selected variables. These included age ($M=71.62$), years since their

COPD diagnosis ($M=10.44$), and BMI ($M=26.42$). In addition, the table includes the patient's values for the Big Five personality variables [17].

Table 1 Frequency counts for selected variables (N=39).

Variable	Category	n	%
Gender	Male	22	56.4
	Female	17	43.6
Race/Ethnicity	Caucasian	31	79.5
	African American	2	5.1
	Two or more races	2	5.1
	Other	4	10.2
Current Tobacco Use	Yes	12	30.8
	No	27	69.2
Yearly Income	Under \$25,000	22	56.4
	\$25-\$50,000	9	23.1
	\$50-\$75,000	6	15.4
	Over \$75,000	2	5.1

Table 2 Frequency counts for outcome variables (N=39).

Variable	Category	n	%
Forced expiratory volume	Very Severe (20%-29%)	8	20.5
	Severe (30%-49%)	19	48.7
	Moderate (50%-79%)	12	30.8
CCQ quality of life ranges	Very good life quality	19	48.7
	Moderate life quality	16	41
	Severely Impaired Life quality	4	10.3
Disease acceptance level	Low acceptance	3	7.7
	Moderate acceptance	23	59
	High acceptance	13	33.3

Table 3 Intercorrelations among the primary study scale (N=39).

Scale	1	2	3
Chronic COPD Questionnaire	1.00		
Illness Cognition Questionnaire	-0.44*	1.00	
Neuroticism	0.75**	-0.45*	1.00
* $p < 0.005$, ** $p < 0.001$			

Thirty-nine participants were included in the study over a 14-day period at Three Rivers Medical Center in Grants Pass, Oregon. The participants had received a diagnosis of COPD by their health care provider. Of those asked to participate, 97% of agreed to participants in the study. The mean age of the

study participants was 71 years old ($N=39$, $SD=10.7$). Of the participants, 56% ($n=22$) were male and 44% ($n=17$) were female. The median pack years smoked for participants' was 40 pack years. The median years since disease diagnosis were 11 years. The mean FEV1% was 44% ($N=39$, $SD=15.4$) of predicted based upon age, gender and ethnicity. The median FEV1 places the majority of participants in the moderate to severe stage of COPD based upon the current GOLD COPD classification. None of participants were categorized as Stage I COPD, 28% ($n=11$) of participants had Stage II COPD, 39% ($n=15$) had Stage III COPD, and 33% ($n=13$) participants had Stage IV COPD. The median body mass index (BMI) was 27, which placed the majority of participants in the mildly obese category.

Of the participants, 46% ($n=18$) were currently married, 15% ($n=6$) were currently divorced, 20% ($n=8$) were widowed, 15% ($n=?$) were divorced, 13% ($n=?$) had never been married, and 5% ($n=2$) were separated. Participants were not asked if they were in a long-term relationship or level of family support. Of those participating, 46% ($n=18$) used supplemental oxygen daily, and 54% ($n=21$) did not use any supplemental oxygen. Of the participants, the mean FEV1 was 44% ($N=39$, $SD=15.4$). None of the participants were Stage I COPD, 28% ($n=11$) of participants had Stage II COPD, 39% ($n=15$) had Stage III COPD, and 33% ($n=13$) of participants had Stage IV COPD.

Answering the Research Questions

The study showed a relationship between Health-Related Quality of Life (HRQOL) and disease acceptance correlation was significant ($r=-0.44$, $p<0.005$) which provided support to reject the null hypothesis and affirming the statistically significant relationship between HROQL and disease acceptance. The correlation analysis showed a statistically significant relationship between Health-Related Quality of Life (HRQOL) and Neurosis which was significant ($r=0.75$, $p<0.001$) which provided support to reject the null hypothesis. The correlation was significant ($r=-0.45$, $p<0.005$) for the negative relationship between Neurosis and disease acceptance, which provided support to reject the null hypothesis.

Research Question 4 examined the relationship between Neurosis mediating the relationship between Health-Related Quality of Life (HRQOL) and disease acceptance. To answer this question, **Table 3** displays the relevant multiple regression model. The overall model was significant ($p=0.001$) and accounted for 57.4% of the variance in quality of life. Inspection of the table found $\beta=0.69$, mediating variable, neuroticism, to be significant ($p=0.001$) while the predictor β =variable, disease acceptance (-0.13 , $p=0.30$) was not significant. This combination of findings provided support to reject the null hypothesis.

In summary, this study used data from 39 patients to determine association between personality characteristic/type of neuroticism and disease acceptance on Health Related Quality of Life (HRQOL) in patients with Chronic Obstructive Pulmonary Disease (COPD). Hypothesis 1 (disease acceptance and quality of life) was supported. Hypothesis 2 (neuroticism

and quality of life) was supported. Hypothesis 3 (neuroticism and disease acceptance) was supported. Hypothesis 4 (neuroticism mediating the relationship of disease acceptance and quality of life) was supported. In the final chapter, these findings are compared to the literature, conclusions and implications will be drawn, and a series of recommendations are suggested.

Conclusion and Discussion

The purpose of this study was to examine the relationship between personality characteristics, especially neuroticism, and disease acceptance on the Health-Related Quality of Life (HRQOL) in those with Chronic Obstructive Pulmonary Disease (COPD). Chronic illness will be the leading cause of death in the world by 2020 [2] and COPD is the one of the few diseases in the United States and globally that is increasing. Chronic diseases such as COPD ought to have a multifaceted approach to achieve the greatest benefit to individual patients' care.

Limitations of the Study

One of the limitations of the study was that the recruited patients were not fully representative of the COPD population. The method of patient recruitment included asking only patients formally diagnosed with COPD that were referred to pulmonary rehabilitation. This also limited the participants' ethnic and racial diversity, as the majority of study participants were Caucasian, which may limit the study's generalizability to the overall COPD population. Another limitation was the small sample sized used in the study. A power analysis conducted prior to the study implementation indicated a sample of 68 participants was necessary to obtain a power greater than 0.80. Following a 14-day recruitment period, 39 participants agreed to participate; this lowered the power of the study's results. The participants were recruited through a pulmonary rehabilitation program, which may have skewed the participant selection to those who had accepted they had a chronic disease and might have been more open to interventions than the general COPD population is. Also, participation was voluntary, and those with negative personality characteristics may have elected not to participate in the study. No information was collected from the patients who declined to participate to determine if they were more prone to negative personality characteristics or if they had low disease acceptance. The use of a cross-sectional data can lack the ability to establish temporality between the variables under study cross-sectional. The study had multiple limitations, which could have minimized its generalizability.

Future Research

Possible future research questions would be to examine other factors that could improve HRQOL. The issues of social support systems such as extended family support or religious belief may affect patients' ability to care for themselves and HRQOL. Few researchers have examined how many patients with chronic illness with depression or anxiety are referred to psychiatry or a therapist and whether these providers'

interventions improve HRQOL. Another issue for possible research is if pulmonary rehabilitation attempted to teach coping skill or use or use counseling would show an improvement HRQOL. Another issue that may need further exploration is the difference between gender effects on HRQOL in those with chronic diseases. Spirituality may be an issue for further research to determine if this aspect of a patient with COPD improves HRQOL or lessens negative emotions such as anxiety or depression compared to those who are less spiritual. A qualitative research method may be advantageous to examine participants for patterns of common themes among those with neurotic or conscientiousness personality characteristics to help focus quantitative research in those with chronic illnesses such as COPD. A larger sample size would dramatically improve the power of the study, as would a greater representation of different ethnic and social-economic classes to allow for greater generalizability. A longitudinal research design would allow for long-term observations to determine trends of HRQOL over different periods of a patient's that may change in those with COPD due to factors such as worsening shortness of breath, chronic elevated carbon dioxide levels that may not be captured in cross-sectional cohort studies.

Summary

The study analyzed whether there are relationships between Health-Related Quality of Life (HRQOL), disease acceptance and personality types/characteristics in COPD. The study included a quantitative correlational research design to examine the relationship by using self-reporting questionnaires and functional data. The study design was to correlate the effect of personality type and disease acceptance on the HRQOL. The study found that there was a significant negative correlation between HRQOL and disease acceptance, $r=0.42$, $p=0.008$. The second research question asked about the relationship between quality of life and neurosis. There was a significant negative correlation between HRQOL and neurosis, $r=-4.3$, $p=-0.007$. The third research question asked about the relationship between neurosis and disease acceptance. The study analysis found a statistically significant negative correlation between neurosis and disease acceptance, $r=-4.3$, $p=0.007$. The fourth research question asked whether neurosis mediates the relationship between quality of life and disease acceptance. The study found that neurosis did mediate the relationship between HRQOL and disease acceptance. A Spearman rho and Pearson correlation were performed with statistically significant findings between personality type of neurosis on HRQOL, $r=-0.428$, $p=0.008$, and disease acceptance on HRQOL, $r=0.416$, $p=0.007$. A regression analysis found a significant correlation $R^2=0.574$ (2,39), $F=24.29$, $p=0.000$. The mediated regression showed that approximately 57% of the Health-Related Quality of Life (HRQOL) was accounted for by Neurosis personality type.

Although the study did find statistical significance between all four-research questions, more study is necessary to determine if these findings represent causality and are generalizable to the overall COPD population due to the

limitations of the study. The information in this study can be used by the Advanced Practice Nurse to look for personality types/characteristics effect on their Health-Related Quality of Life in their patients with chronic diseases. Nursing has always aimed to take a holistic view of their patients and this study should emphasize that point to continue to look at the patients' overall quality of life and not just the physiological indicators commonly used in healthcare today. These findings could represent a starting point for further studies to examine how personality affect HRQOL in those with COPD and how to use this information to take a more holistic approach to patient care at the national level, pulmonary rehabilitation programs, and for the individual providers for COPD patient care.

Availability of Data and Materials Section

The datasets during and/or analysis during the current study available from the studys author on reasonable request.

Authors' Contributions Competing Interests

The authors declare that they have no competing interests.

Authors Contributions

AM was the sole author contributing to the manuscript.

Ethics Approval and Consent to Participate

This study was approved by the Institutional Review Board of Maryville University (IRB No. 14-78) and informed consent was obtained from all individual participants included in the study.

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