

# Consequences of chronic obstructive pulmonary disease and chronic heart failure: The relationship between objective and subjective health

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## Abstract

This study investigates whether the relationship between objective health parameters and general health perceptions was mediated by symptoms of dyspnoea and physical functioning in patients with chronic obstructive pulmonary disease (COPD) and patients with chronic heart failure (CHF). The different health parameters were organised according to Wilson and Cleary's conceptual model of patient outcomes (Wilson & Cleary (1995). *Journal of the American Medical Association*, 273, 59–65). Second, we investigated whether perceptions of personal control were related to the health parameters in the model. Consecutive patients with COPD and CHF were included from the outpatient clinics of a university hospital and a general hospital, and from a rehabilitation centre, all in the Netherlands. Ninety-five COPD patients (aged  $65.0 \pm 9.3$ ; forced expiratory volume in 1 s ( $FEV_1$ ) < 70%) were included and compared with 90 CHF patients (aged  $59.6 \pm 10.0$ ; left ventricular ejection fraction (LVEF) < 45%). The relationship between objective health parameters ( $FEV_1$  or LVEF) and subjective health (self-reported physical functioning) was not mediated by symptoms of dyspnoea.  $FEV_1$  or LVEF and symptoms of dyspnoea were independently related to self-reported physical functioning, which was directly related to general health perceptions. Perceived health competence was related to symptoms of dyspnoea and general health perceptions in patients with either COPD or CHF. Although patients with COPD reported lower levels in all self-reported health parameters in the model than the patients with CHF, this study showed that the relations between the health parameters in the model were comparable for COPD and CHF patients.

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## Introduction

The development of a chronic illness may affect several aspects of a patient's health (Global Initiative for Chronic Obstructive Lung Disease, 2003; Hunt et al.,

2001a). These consequences of illness can be regarded as a process of illness progression, which normally starts at the development of physiological or biological abnormalities, resulting in symptoms and physical limitations that are noticed and reported by the patients. Eventually, patients will have to face their inability to take part in their usual activities, which will influence their perceptions of their health and ultimately their general well-being. This chain of consequences of chronic illness runs from the objective effects of the illness (physiological abnormalities), to health status (physical functioning), and ultimately to the subjective perception of health (health perceptions and well-being). This study investigated the relationships between objective and subjective health in Chronic Obstructive Pulmonary Disease (COPD) and Chronic systolic Heart Failure (CHF) patients.

To study the impact of chronic illness, most clinical trials originally used the biomedical model, which assessed the effects of etiological factors on the pathological process and eventually on the clinical outcomes (Stucki & Sigl, 2003; Johnston & Pollard, 2001). The aim of these studies was to enhance diagnosis and treatment of patients and was usually focused on largely objective health indicators. Studies from the social sciences, on the other hand, usually focus on the consequences of disease as perceived by the patients (Wood-Dauphinee, 2001; Wilson & Cleary, 1995), and are mainly interested in the subjective consequences of disease. Wilson and Cleary (1995) have presented a conceptual model of patient outcomes, which integrates the biomedical model with the social scientific model of health. They organise different measures of health from biological factors at one end of the continuum to perceived health at the other end of the continuum. Moreover, this model assumes specific causal relationships between the various health concepts, without reciprocal effects (Sullivan, Kempen, Van Sonderen, & Ormel, 2000). The five levels in the model, representing different health concepts, are (1) biological and physiological variables, (2) symptom status, (3) functional status, (4) general health perceptions, and (5) overall quality of life (QoL).

The present study investigates the relationship between objective and subjective health in patients with COPD and CHF. Both COPD and CHF are seriously debilitating conditions that have a profound impact on patients' functional status (Gosker et al., 2003) and QoL (Ferrer et al., 1997; Juenger et al., 2002). COPD is characterised by airflow limitation resulting in a reduced ventilatory capacity, and for most patients in shortness of breath or dyspnoea (Boueri, Bucher-Bartelson, Glenn, & Make, 2001). In many COPD patients, these symptoms of dyspnoea lead to limitations in daily activities. CHF may result from various cardiac disorders and is manifested in symptoms such as

dyspnoea and fatigue (Berry & McMurray, 1999). The consequences of CHF include a reduced exercise capacity and fluid retention, which may lead to pulmonary and peripheral oedema (Hunt et al., 2001b).

We used Wilson and Cleary's model to organise the health variables from objective to subjective health. The biological or physiological variables from Wilson and Cleary's model were operationalised as pulmonary function for COPD patients, indicated by the forced expiratory volume in 1 s ( $FEV_1$ ), an objective measure of airflow limitation (Global Initiative for Chronic Obstructive Lung Disease, 2003). For patients with CHF, objective physical functioning was operationalised as left ventricular function, indicated by the left ventricular ejection fraction (LVEF) (Hunt et al., 2001a). Furthermore, in this study, symptom status in Wilson and Cleary's model was operationalised as dyspnoea, since symptoms of dyspnoea are the main symptoms experienced by both COPD and CHF patients.

Our study was particularly aimed at two research questions. First, we addressed the question of whether the relationships between physiological parameters ( $FEV_1$  for COPD and LVEF for CHF) and general health perceptions were mediated by symptoms of dyspnoea and physical functioning. Wilson and Cleary's model does not mention whether only indirect relationships exist (for instance, physiological variables are related to physical functioning through symptom status) or whether direct relationships between the variables (for example, between physiological variables and physical functioning) exist as well. Only a few previous studies have empirically tested (parts of) Wilson and Cleary's model (Sullivan et al., 2000; Cosby, Holzemer, Henry, & Portillo, 2000; Janz et al., 2001), and only one of them has studied the sequence from objective to subjective health factors by means of structural equation modelling (Sullivan et al., 2000). This study, by Sullivan et al. supported Wilson and Cleary's model to the extent that the relationship between biological variables and general health perceptions was found to be mediated by symptoms and physical functioning. Apart from this indirect effect of biological variables on general health perceptions, Sullivan also reported direct relationships between non-adjacent variables in the model, that is, between biological variables and physical functioning, between symptoms and general health perceptions, and between biological variables and general health perceptions (Sullivan et al., 2000). Consequently, we hypothesised the existence of direct as well as indirect relationships between the health parameters. Therefore, we adapted Wilson and Cleary's model in order to incorporate the direct relationships between the non-adjacent variables as well (see Fig. 1) and investigated whether this new model was applicable for both COPD and CHF. With respect to clinical characteristics, COPD and CHF are comparable to a certain extent. Both are

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