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With the strength to carry on: The role of sense of coherence and resilience for anxiety, depression and disability in chronic obstructive pulmonary disease

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Abstract

People with chronic obstructive pulmonary disease (COPD) are affected by somatic as well as psychological symptoms such as anxiety and depression and reduced quality of life. Protective psychological factors exist which enable people to adapt successfully to disease, but research about these factors in COPD is sparse. The aim of this study was to investigate whether sense of coherence (SOC), resilience and social support are potential protective factors and thus associated with reduced levels of symptoms of anxiety and depression and lower perceived disability in people with COPD. An online study was conducted in which $n = 531$ participants with COPD completed questionnaires assessing protective psychological factors, anxiety and depressive symptoms (Hospital Anxiety and Depression Scale) and disease-specific disability (COPD Disability Index). Regression analyses were conducted. SOC and resilience contributed significantly to reduced levels of symptoms of anxiety and depression and to lower disease-specific disability after controlling for confounding variables and disease severity. Symptoms of anxiety and depression were most strongly predicted by SOC. This study's results indicated that SOC and resilience could represent helpful individual resources due to their protective potential helping people adjust to COPD. Limitations and implications of this study are discussed.

Keywords

Anxiety, COPD, depression, quality of life, resilience, sense of coherence

Introduction

Chronic obstructive pulmonary disease (COPD) is characterized by irreversible airflow limitation and symptoms such as chronic dyspnea, cough and sputum production.[1] Due to its progressive nature, the lung function in persons with COPD steadily decreases between the earliest stage of disease (stage I, as defined by the Global Initiative for Chronic Obstructive Lung Disease (GOLD)[2]) and the final stage (IV) that includes very severely limited airflow.[1,2] Aims of medical treatment are symptom reduction, avoidance of exacerbations and delay of progression.[1] The prevalence of COPD in people aged 40 years and older is estimated around 10%,[3,4] with rates nearly doubling every following decade of life.[3] In the elderly, COPD is ranked third among the 15 most burdensome disorders after ischaemic heart disease and stroke.[5] Chronic respiratory diseases are a main cause for global years lived with disability, with

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the largest contributor being COPD followed by asthma.[6] Quality of life in patients with COPD is substantially impaired.[7] While rates for years lived with disability caused by COPD have risen between 1990 and 2010, rates for asthma have decreased by a minor extent during the same period.[6] This could be due to the fact that symptom reduction in COPD is currently not as effective as in asthma, where airflow limitation is usually reversible and treatment options have improved substantially.[8]

This leaves people suffering from COPD with the crucial question about what else influences quality of life in the face of their disease. Interestingly, illness-specific and general quality of life in COPD not only depends on the severity of the disease alone[7,9,10] but also on psychopathological symptoms of anxiety and depression.[11–13] Accordingly, studies found that up to 56% of people suffering from COPD were diagnosed with clinically relevant anxiety disorders or combinations of anxiety and depressive disorders,[12,14,15] while non-clinically significant amounts of symptoms of anxiety or depression were reported in up to 80%.[15–17] Besides the impact on quality of life, symptoms of anxiety and depression in COPD have various other consequences. Studies found that symptoms of depression in COPD are a risk factor for poorer physical and mental health outcomes,[7,12] increased mortality[14,18,19] and rehospitalization.[20,21] Anxiety is not only a risk factor for more subjective impairment and reduced quality of life[22,23] but also for hospitalization[15,21] and more consultations.[12] Recently, studies investigating the influence of illness perceptions and illness-specific fears also found disease severity to be one of multiple important predictors for quality of life and psychological comorbidities in COPD.[24,25] Still, there is currently no evidence unveiling which aspects serve as protective factors and help people suffering from COPD prevent or attenuate anxiety and depression, that is, psychological comorbidities that affect living with their disease.

Protective factors help people to cope with stressors. For example, most older adults experience stressful life events as well as neurobiological or physical changes or diseases, but only a relatively small number become clinically relevant depressed.[26] Hence, psychosomatic research has increasingly become interested in exploring factors describing or underlying the different capabilities for adjustment to stressors. As a part of a paradigm shift from the study of risk factors to protective factors, focusing on such positive personal and interpersonal strengths has been recommended to allow individuals to thrive and grow even in the face of adverse events.[27] The importance of protective psychological factors has already been shown for the general population.[28–34] For people suffering from COPD, learning more about these factors could help identifying those in need of more support for maintaining and building personal and interpersonal strengths. Also, it could help explain the different extents of anxiety and depression in people with COPD. Among the discussed constructs are sense of coherence (SOC), resilience, and social support, which are consecutively described below.

Antonovsky conceptualized SOC as a:

> global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that 1) the stimuli deriving from one's internal and external environments in the course of living are structured, predictable, and explicable; 2) the resources are available to one to meet the demands posed by these stimuli; and 3) these demands are challenges, worthy of investment and engagement. (p. 191)[29]

These three factors were named comprehensibility, manageability and meaningfulness.[29] A variety of longitudinal and cross-sectional studies in patient samples and samples from the general population found SOC to be associated with quality of life and self-reported health, negatively correlated with symptoms of anxiety and depression and predictive of successful coping with stress.[31,33–39] In general populations, stronger SOC was found to be associated with decreased mortality, even after controlling for sociodemographic and established risk factors.[30–32] Due to its wide adoption including cross-cultural and international applications, SOC has been described as the most influential of the proposed constructs protecting from negative effects of adverse events.[40] To date, little is known about SOC in populations suffering from COPD. Delgado found that SOC, pulmonary function and the perception of impaired ability to function accounted for 73% of the variance in quality of life, with SOC being the strongest predictor.[41]

As another important protective factor discussed in psychological research, the term resilience refers to the ability to maintain relatively stable healthy levels of psychological and physical functioning in adulthood, despite stress and adversity.[42] The current perception of resilience is multidimensional and shows similarities to SOC, with constitutional variables (e.g. temperament, personality, potentially overlapping with SOC's comprehensibility) and specific skills (especially problem-solving, resembling SOC's

manageability) that work together to enable persons to cope well with (life threatening) traumatic life events.[43] Initially, resilience was conceptualized as a rather rare attribute of people able to adapt to events of overwhelming adversity.[44] Recently, however, resilience was found to be more common than expected when people are confronted with severe life events.[42] Reminiscent of the findings regarding SOC, researchers found resilience measured with Wagnild's and Young's Resilience Scale[44] to be related to reduced levels of anxiety and depression[39,45–47] and stress,[46] as well as elevated self-ratings of health and reduced symptom distress,[47] higher quality of life and physical well-being in the general elderly population.[39,48] Since suffering from a diagnosis of COPD can be regarded as a major life event, resilience presumably plays an important role in the individuals' impairment due to the illness. Despite the potential influence of resilience on quality of life and psychological comorbidities, research on resilience in COPD is sparse.

A third potential protective factor is social support, defined in this article as the perceived functional support from different groups like family members, partners or friends.[49] Negative and positive aspects of perceived social support were found to be associated with elevated or reduced anxiety in persons with COPD.[50] Also, the quality of social support is important in the development of depression in the elderly and perceived social support attenuates the impact of stressful events.[26] Within the context of pulmonary rehabilitation, social support was found to be associated with success of rehabilitation[51,52] as well as with 6-year survival rate.[52]

In light of the recent shift of attention towards positive psychological factors buffering the impact of stress or stressful events and promoting quality of life in the wake of serious circumstances, it seems worthwhile to investigate such prominent constructs as SOC, resilience and social support in COPD. Still, in the field of COPD research, there is currently a lack of studies in this regard. Due to their various impacts, illness-specific quality of life (or illness-specific disability), anxiety and depression play crucial roles in living with COPD. Thus, the aim of this study was to simultaneously investigate the potential protective factors SOC, resilience and social support in their relationship to different outcomes. Due to preceding research regarding these protective factors, we anticipated them to be associated with reduced anxiety and depression as well as reduced illness-specific disability as an inversed conceptualization for disease-specific quality of life.

Method

Participants

Participants were assessed using an online survey, which was promoted by a self-help organization for COPD in Germany. The promotion took part on their website and with the help of their mailing list. Participation was voluntary and the survey was completely anonymous. No financial compensation was offered. Data collection took place from January 2014 to July 2015. A local ethics committee approved the study (reference number 2013-36 k). A total of 626 participants with self-reported COPD and who reported their disease stage (according to the GOLD[2]) took part in the study. After data screening, $n = 55$ participants were excluded because of reported repeated participation and $n = 11$ participants were excluded because they were aged under 40 (unlikely age for a valid diagnosis of COPD[3,4]). Additionally, $n = 29$ participants were excluded due to being statistical outliers in survey execution time (mean duration – 1 *SD*; 19.56 min or less, $n = 29$). There were no further exclusion criteria. Therefore, the final sample consisted of $N = 531$ participants.

Procedure

First, participants completed informed consent procedures, where they were informed about the anonymity of the study, the possibility to pause the survey at any time and to withdraw from the study without any disadvantages. Afterwards, they were asked to fill out psychological questionnaires and a questionnaire including socio-demographic data and COPD-related items. Disease severity was assessed according to the GOLD stages,[2] ranging from I = *mild* to IV = *very severe*. In Germany, it is standard procedure for their physician or pulmonologist to inform a COPD patient about his or her GOLD stage. In case of uncertainty concerning their health status, we encouraged participants either to ask their physician or to choose the answer 'GOLD stage unknown' and then continue with the survey. Participants who reported 'GOLD stage unknown' were excluded from the analysis to avoid inclusion of non-COPD patients. During the whole time, participants were allowed to pause and continue the survey, but they could only finish the survey after completion of every item. Participants had the possibility to email the investigators in case of difficulties with the survey.

Measures

Demographics and COPD-related variables. Demographics and COPD-related variables were collected with a self-developed questionnaire including age, sex, height, weight, marital status as well as smoking status and disease severity (GOLD stage).

COPD-specific disability. The COPD Disability Index (CDI)[13] was administered to assess the perceived disability caused by their breathing difficulties concerning health status and daily life. It includes seven items on an 11-point rating scale (0 = *no impairment*, 10 = *total impairment*) assessing impairment in family commitments and the household, recreation, social activities, job, sexual life, self-supply and breathing. The CDI has demonstrated good internal reliability, construct and predictive validity.[13,53]

Anxiety and depression. The Hospital Anxiety and Depression Scale (HADS)[54] was used for the assessment of psychopathological symptoms of anxiety and depression. The HADS has fourteen items, seven of which are used to create a sum score for anxiety, seven for depression. Each item score ranges from 0 to 3. Therefore, sum scores for anxiety and depression each range from 0 to 21, with higher scores reflecting higher symptom burden. The HADS is recommended as a screening tool for anxiety in COPD patients[55] and commonly used in COPD research.[56]

Sense of coherence. The German nine-item version (SOC-L9[57]) of Antonovsky's Sense Of Coherence Scale (SOC-29[58]) was used in this study. While the original 29-item version has three dimension (comprehensibility, manageability and meaningfulness), the SOC-L9 is conceptualized as a unidimensional scale. Nevertheless, it shows a high correlation with the original version. Participants are asked to rate items on a seven-point semantic differential scale (scoring 1 to 7) with two varying anchoring phrases. The sum score ranges between 9 and 63. The SOC-L9 allows for assessing SOC economically and was found to be a reliable and valid instrument.[57]

Resilience. Resilience was assessed with the 13-item short version of the Resilience Scale (RS-13)[59], which was originally developed by Wagnild and Young[44] to measure resilience as a personality characteristic moderating the negative effects of stress. In their original work, they proposed two factors (personal competence and acceptance of self and life) identifying individuals who are resilient.[44] The RS-13[59] also includes these two factors that both load on a superordinate factor (resilience). Thus, a resilience sum score can be computed. Item scores range from 1 (disagree) to 7 (totally agree), constituting a sum score range from 13 to 91, with higher scores reflecting higher resilience. The RS-13 is a validated and reliable instrument.[59] Wagnild's and Young's original RS was named the best instrument to study resilience due to its psychometric properties.[60]

Social support. The 7-item short version of the social support questionnaire (German: Fragebogenzursozialen Unterstützung, FSozU-k7[49,61]) was used as a global score for perceived social support regarding family members, partners and other important people such as friends, neighbours, colleagues. The participants are asked to rate the items on a 5-point Likert-type scale (1 = *not true at all* to 5 = *completely true*). The questionnaire serves as a short and reliable measure and demonstrated good validity.[49]

Data analysis. SPSS version 22.0 was used to carry out statistical analysis of data. Beforehand, a multivariate analysis of variance was conducted to explore possible gender differences in GOLD stage, predictor and outcome variables of the subsequent regression analyses. In order to examine the influence of protective psychological factors on disease-specific disability, anxiety and depression, three hierarchical multiple linear regression analyses (block-wise) were used. SOC, resilience and social support were entered in a second step after controlling for age, gender, body mass index (BMI) and disease severity (first step). Statistical assumptions for the regression analyses were examined beforehand: multicollinearity was ruled out; tolerance values were >0.20.

p Values used in all analyses were two-tailed and $p \leq 0.05$ was considered statistically significant. Completed surveys had almost no missing values because of the configuration of the survey items (mandatory). The only exceptions were missing values in the string variables height ($n = 2$ missing values) and weight ($n = 1$ missing value).

Results

Demographic and clinical characteristics of participants

The final sample of $n = 531$ had a mean age of 60.7 years ($SD = 8.0$) and gender was nearly equally distributed (51% female). Most participants used to

Table 1. Sample characteristics.[a]

Characteristics	Data
Age mean in years (*SD*)	60.7 (8.0)
Female	58.9 (7.9)
Male	62.5 (7.8)
BMI mean (*SD*)	26.2 (6.6)
Sex, no. (%)	
Female	271 (51)
Male	260 (49)
Partner status, no. (%)	
Married or partner	364 (68.6)
No partner, widowed, divorced	167 (31.4)
COPD severity according to GOLD standards, no. (%)	
I	19 (3.6)
II	106 (20.0)
III	180 (33.9)
IV	226 (42.5)
COPD-specific disability (CDI) mean (*SD*)	5.5 (2.2)
HADS anxiety mean (*SD*)	9.5 (4.4)
HADS depression mean (*SD*)	9.5 (4.8)
Smoking status, No. (%)	
Never smoker	22 (4.1)
Former smoker	381 (71.8)
Current smoker	128 (24.1)
Mean duration for survey completion in minutes (*SD*)	39.6 (18.7)

BMI: body mass index, CDI: COPD disability index, COPD: chronic obstructive pulmonary disease; GOLD: Global Initiative for chronic Obstructive Lung Disease, HADS: Hospital Anxiety Depression Scale.

[a]Data are presented as no. or % unless otherwise indicated.

smoke (71.8%), 24.1% were still smoking, 4.1% never smoked. A total of 125 participants reported earlier stages of disease (stage I = 3.6%, stage II = 20%), 180 participants (33.9%) suffered from COPD grade III (*severe*), while 226 (42.6%) suffered from grade IV (*very severe*). Average COPD-specific disability (CDI mean) was 5.5 ($SD = 2.2$, possible range 0–10). See Table 1 for further details on the sample characteristics.

COPD-specific disability, anxiety and depression

In order to explore the influence of SOC, resilience and social support on disease-specific disability and psychological comorbidities (symptoms of anxiety and depression), hierarchical multiple regression analyses were conducted for each of the three outcomes. In the first step, potentially confounding variables (age, gender, BMI) and illness severity (GOLD stage) were entered in each regression model. The first step explained a significant amount of variance for each dependent variable ($ps < 0.01$). The adjusted R^2 (explained variance) was 0.04 for depression, 0.03 for anxiety, and 0.22 for disease-specific disability. Adding SOC, resilience and social support in the second step yielded significant increases in explained variance for all three outcomes ($ps < 0.01$).

Of the three outcome variables, the most variance (adjusted $R^2 = 0.58$) was explained in depression, where SOC was the strongest of all predictors ($\beta = -0.58$, $p < 0.01$) in the final model. Resilience ($\beta = -0.14$), social support ($\beta = 0.11$) and GOLD stage ($\beta = 0.16$) were significant predictors, too ($ps < 0.01$). Adjusted R^2 in the final model for anxiety was 0.41. Here, SOC was also the strongest predictor ($\beta = -0.49, p < 0.01$). The other significant predictors were resilience ($\beta = -0.17$, $p < 0.01$) and age ($\beta = -0.07$, $p < 0.05$). A similar amount of variance was explained in disease-specific disability, where the adjusted R^2 was 0.40, with GOLD stage ($\beta = 0.47$), SOC ($\beta = -0.26$) and resilience ($\beta = -0.17$) being significant predictors ($ps < 0.01$). In summary regarding the protective factors, the negative beta weights indicated that more SOC and resilience were associated with less perceived disability, symptoms of anxiety and depression, while social support only yielded significant influence on depression. See Table 2 for the intercorrelations and Table 3 for a summary of the hierarchical multiple regression analyses.

Discussion

Summary of main findings

While extensive research has been conducted about the negative impacts of COPD as a chronic illness, knowledge about what enables people to lead a pleasant lifewith COPD without the negative consequences is rather sparse. Treatment of COPD is not as effective as in other chronicconditions; quality of life is seriously diminished and people suffering from COPD often also suffer from comorbid symptoms of anxiety or depression. Still, it is not entirely clear who develops anxiety and depression in COPD and also knowledge is missing about why people suffering from COPD regard themselves as less disabled compared to others, in spite of comparable disease severity. Since we proposed focusing on positive psychological factors helping people to adjust to severe stressors, this article explored the role of SOC, resilience and social support in COPD. We found these factors to be substantially negatively associated

Table 2. Intercorrelations.

	CDI	HADS anxiety	HADS depression	SOC	Resilience	Social support
GOLD	0.47[a]	0.05	0.18[a]	−0.02	0.01	0.02
Age	0.02	−0.17[a]	−0.08	0.17[a]	0.14[a]	0.01
Outcomes						
CDI		0.48[a]	0.58[a]	−0.41[a]	−0.36[a]	−0.25[a]
HADS Anxiety	0.48[a]		0.73[a]	−0.63[a]	−0.52[a]	−0.33[a]
HADS Depression	0.58[a]	0.73[a]		−0.73[a]	−0.58	−0.46[a]
Predictors						
SOC	−0.41[a]	−0.63[a]	−0.73[a]		0.69[a]	0.51[a]
Resilience	−0.36[a]	−0.52[a]	−0.58[a]	0.69[a]		0.40[a]
Social support	−0.25[a]	−0.33[a]	−0.46[a]	0.51[a]	0.40[a]	

CDI: COPD disability index, GOLD: Global Initiative for Chronic Obstructive Lung Disease, HADS: Hospital Anxiety Depression Scale, SOC: sense of coherence.
[a]$p < 0.01$.

Table 3. Hierarchical multiple regression analyses.[a]

		CDI		HADS anxiety		HADS depression	
Model	Predictors	β	R^2adj	β	R^2adj	β	R^2adj
Step 1			0.22[b]		0.03[b]		0.04[b]
	Age	−0.05		−0.17[b]		−0.11[c]	
	Gender	−0.02		−0.04		0.02	
	BMI	0.06		−0.03		−0.03	
	GOLD stage	0.49[b]		0.07		0.19[b]	
Step 2			0.40[b]		0.41[b]		0.58[b]
	Age	0.02		−0.07[c]		0.01	
	Gender	0.01		0.01		0.07[c]	
	BMI	0.05		−0.05		−0.04	
	GOLD stage	0.47[b]		0.04		0.16[b]	
	SOC	−0.26[b]		−0.49[b]		−0.58[b]	
	Resilience	−0.17[b]		−0.17[b]		−0.14[b]	
	Social Support	−0.06		−0.01		−0.11[b]	
ΔR^2 from step 1 to step 2			0.17[b]		0.38[b]		0.54[b]

GOLD: Global Initiative for Chronic Obstructive Lung Disease; BMI: body mass index, CDI: COPD disability index, R^2adj: adjusted R^2, SOC: sense of coherence.
[a]Results from regression analyses depicting the contribution of Sense of Coherence (SoC-9), Resilience (RS-13) and social support (FSozU) on disease specific disability (outcome variable: COPD-Disability-Index, CDI), anxiety (HADS Anxiety) and depression (HADS depression). In a stepwise regression covariates were controlled for in the first model. In the second model SOC, resilience and social support were added.
The explained variances are reported as adjusted R^2.
[b]$p < 0.01$: significance of increase in explained variance and significance of beta weights.
[c]$p < 0.05$.

with symptoms of anxiety and depression as well as perceived illness-specific disability.

Regarding symptoms of anxiety and depression, SOC was the strongest, above socio-demographic factors, disease severity and other protective factors. This was in line with Antonovsky's claim that SOC builds the basis for successful coping with stressors[58] as well as Delgado's study assessing quality of life and SOC in patients with COPD.[41] Earlier studies also found strong correlations between SOC and symptoms of anxiety and depression in different samples without COPD.[35–38] Resilience both contributed to symptoms of anxiety and depression, but to a lesser extent than SOC. Perceived social support on the other hand partly explained only depressive symptoms, which was in line with previous research about

development of depression in the elderly.[26] Antonovsky emphasised SOC's relevance across gender, social class, region and culture.[58] This claim has been questioned, because in some[41,57] but not all studies[30,31] age and gender influenced SOC or the examined outcomes. In this study, we found a small but significant gender difference in SOC, with men reporting higher SOC. While no differences were found in symptoms of depression generally, gender influenced depression when SOC, resilience and social support were taken into account.

Average COPD-specific disability was higher than in previously reported studies using the CDI with outpatients.[13,53] In our regression model predicting illness-specific disability, GOLD stage explained a substantial amount of variance. This was also found in previous studies and was in line with the CDI's conceptualisation and validation as an instrument sensitive to disease stage.[13,53] While GOLD stage was the only significant predictor in the first step of the regression model, adding SOC, resilience and social support in the final model increased the explained variance significantly, with SOC being the strongest contributor among the protective factors.

Since research on positive factors in the adjustment to COPD is scarce, we chose to measure SOC and resilience simultaneously because of their prominent status in the literature and their usage in research in the field of somatic diseases. As expected, we found a substantial intercorrelation. The differing but significant beta weights in the regression analyses suggest these constructs share variance and content, but that they also have divergent aspects and thus are not identical. Another indicator for the uniqueness of both constructs was the absence of multicollinearity between SOC and resilience. Both concepts aim at assessing personality characteristics or competences explaining why people differ in their capability of adaptation to threatening life events or stressors. They represent some sort of process of inner growth,[39] have theoretical and empirical overlaps[62] and share a resemblance concerning the outcomes, because both studies about SOC and resilience investigated the relationship to quality of life, anxiety and depression.

There were a few studies simultaneously assessing SOC and resilience in relationship to perceived physical and mental quality of life in older adults. Nygren and colleagues found a smaller correlation between SOC and resilience than in this study. In their study, resilience was more highly correlated with subjective mental quality of life than SOC, but both did not statistically significant correlate with physical quality of life.[39] In another study, Fossion and colleagues[38] found a strong correlation between SOC and symptoms of anxiety and depression and a correlation between SOC and resilience almost identical to that one found in this study.

Among the problems of comparing SOC and resilience are varying theoretical conceptions,[63] the variety of instruments measuring resilience as well as different uses of both constructs in research as predictor, moderator or outcome. Furthermore, additional similar constructs were proposed, such as Frankl's 'purpose in life'[64] or Kobasa's'hardiness'.[65] Further conceptual work could aim at integrating the variety of concepts in a metatheory explaining what helps people stay healthy and happy. First attempts to propose and construct such a metatheory can be found in the literature.[63,66]

Limitations

Some limitations of this study should be noted. The cross-sectional data did not allow any causal conclusions to be drawn. Therefore, future studies need a longitudinal design with relevant outcomes in terms of psychopathology as well as criterions such as mortality, hospital admissions (due to psychological comorbidities as well as due to exacerbations) and quality of life. Even though it is not possible to provide evidence using cross-sectional studies, they offer relevant information about the associations among the different constructs and also help in planning future (prospective) studies for further investigation. Another limitation was the limited representativeness of the sample, because only internet users could participate. Mean age of 60.7 years was relatively low but comparable to other studies with COPD patients both with internet or regular assessment.[23,24] Moreover, there could have been a self-selection bias since promotion took part via a self-help organisation for COPD in Germany. Due to the study design, there was a lack of information about what distinguished participants from people not choosing to participate aside from obvious reasons like no access to the Internet. More research is needed to analyse the extent to which our findings are transferable to other COPD populations. People with COPD that have Internet access could represent an important population regarding treatment: Because of the often frequently reduced mobility due to COPD, they could profit from easily accessible interventions provided via the

Internet. A further limitation of this study was the reduced reliability of the COPD diagnosis as well as the GOLD stage, since it relied on the participants' report. Therefore, we cannot fully assert that only patients with COPD took part in the study. Our study aimed at the economic assessment of a large sample of people suffering from COPD. Future similar approaches could handle this problem by promoting the survey with the help of pulmonary physicians, who could invite their patients to participate and provide details about the stage of disease. Then again, this would lead to other problems of an ethical nature (e.g. voluntariness of participation) or protection of (data) privacy. Because this study was completely anonymous, we relied on the participants' knowledge about their GOLD stage. Our effort to reduce the risk of falsely ascribed COPD or GOLD stage was to add a 'status unknown' option and exclude participants who chose this option from any analysis. Additionally, participants were asked to pause the survey and to refer to their physician if they were uncertain of their GOLD stage. By not offering financial compensation we prevented people from participating out of monetary motivation, thus we addressed people being motivated to participate in order to contribute to helpful research on the condition they are suffering from.

Strengths of this study

In this study, we were able to reach a large number of people suffering from COPD, willing to give insight about different aspects of their disease. With an economic approach, this study simultaneously assessed SOC, resilience and perceived social support and explored their relationship with concurrent symptoms of anxiety and depression and illness-specific disability. To date, this study is the first to simultaneously investigate these three important constructs in sustaining and promoting personal growth and quality of life in COPD and their relationship to relevant outcomes. Given the substantial consequences regarding quality of life, physical and mental health and mortality, it seems worthwhile to further investigate the protective potential of SOC and resilience as well as social support concerning symptoms of anxiety and depression in COPD. While the potential importance and impact especially of SOC and resilience in COPD was illustrated, further longitudinal studies and experimental research are needed to further evaluate these findings. Future research could help foster our understanding of what helps people with a detrimental condition such as COPD to appraise the burden of their disease to a lesser extent, which could also help in identifying those who need therapeutic support to maintain or enhance intrapersonal skills.

Implications

Compared to the general population and other chronical illnesses, SOC and resilience have only sparsely been investigated in COPD. Our current understanding of the causes and consequences of illness is often limited, with a strong emphasis on its symptoms and the burden of disease rather than asking: What is still pleasant? A change in perspective from illness to health could help the patients as well as practitioners in both inpatient and outpatient settings. Concepts such as SOC did and can foster interdisciplinary approaches within and between psychology, medicine and other behavioural and social sciences.[40] Focusing on individual resources promoting and protecting health in research could endorse subsequent treatments to strengthen them. In the face of a heavily burdening, progressive and lethal condition such as COPD, where treatment concerning symptom reduction is currently not as effective as in other chronic conditions, treatment should aim at sustaining a maximum quality of life. In this regard, this study indicated that particularly SOC could act as an important resource in COPD. Seligmann stated: 'Practitioners need to recognize that much of the best work they already do in the consulting room is to amplify strengths rather than repair the weaknesses of their clients'.[27]

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