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Original article

## Stability of physical self: Examining the role of chronic obstructive pulmonary disease

*Stabilité physique et estime de soi : examen du rôle de la maladie bronchopneumopathie chronique obstructive*

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### Abstract

This observational study compared global self-esteem and physical self scores and their stability over a three-week period in patients with chronic obstructive pulmonary disease (COPD) and healthy adults, through the analysis of day-to-day time series. Two groups were formed: a COPD group of 27 patients with stable and moderate COPD, and a control group of 31 “healthy” adults. The results showed lower mean scores over the study period for global self-esteem, physical self-worth, and each of the physical self subdomains in COPD patients as compared with the “healthy” group. Moreover, the results showed less stability in global self-esteem, physical self-worth, and the physical self subdomains over the same period in these patients. Our principal findings support the assertion of Kernis and colleagues that unstable global self-esteem and physical self reflects a certain vulnerability to endogenous and exogenous events.

*Keywords:* Variability; Self-esteem; Physical self; Dynamics; Chronic respiratory disease; Depression

### Résumé

Cette étude compare le niveau et l'instabilité de l'estime de soi et du soi physique de sujets atteints de bronchopneumopathie chronique obstructive (BPCO) à celles de sujets sains du même âge, sur la base de séries temporelles individuelles de trois semaines consécutives. Vingt-sept patients BPCO de sévérité modérée et 31 sujets sains ont participé à l'étude. Les résultats montrent un niveau inférieur d'estime de soi, de valeur physique perçue et des sous-domaines physiques pour le groupe BPCO. Ils mettent aussi en évidence une instabilité supérieure des patients qui souligne la pertinence des travaux de Kernis à propos de l'instabilité de ces construits reflétant une vulnérabilité aux contraintes environnementales.

*Mots clés :* Variabilité ; Estime de soi ; Soi physique ; Dynamique ; Bronchopneumopathie chronique obstructive ; Dépression

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Everyday life is full of events that can affect the way we feel about ourselves and our bodies (Greenier et al., 1999). These events, from endogenous or exogenous origin, create individual differences in level of self-esteem or physical self (Marsh and Yeung, 1998) and perhaps in stability (Greenier et al., 1999; Kernis and Waschull, 1995; Nezlek and Plesko, 2001; Nowak et al., 2000). Adults with high self-esteem are generally characterized by high levels of sociability, impulsivity (Eysenck

and Eysenck, 1963), emotional stability (Francis, 1997) and resilience to stress (Wylie, 1989). Inversely, people with low self-esteem often present depressive episodes (Butler et al., 1994; Baumeister, 1993). They report more negative emotions, are more sensitive to negative events (Dutton and Brown, 1997; Epstein, 1992), and are more concerned by and with social evaluation (Baumgardner, 1990). The low self-esteem is typically reported in chronic obstructive pulmonary disease (COPD) patients (Engström et al., 1996; Kersten, 1990), who face a number of stresses, including increasing functional limitations and subsequent dependency on others, changes in body image and sexual performance, and the threat of death

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(Toshima et al., 1992). They experience anxiety, especially about dyspnoea episodes (Hynninen et al., 2005; Maurer et al., 2008). COPD patients have low self-efficacy (Kaplan et al., 1993) and depression syndromes that have been reported to be as high as 42% in patients with moderate to severe COPD (Light et al., 1985; McSweeney et al., 1982; Kunik et al., 2005).

Recent research has emphasized the inherent fluctuations of self-esteem (Nezlek and Plesko, 2001; Nowak et al., 2000; Thewissen et al., 2008) and physical self (Amorose, 2001; Ninot et al., 2001). For healthy adults, these perceived dimensions consistently exhibit either noisy fluctuations around a reference value (Marsh and Yeung, 1998), short-term fluctuations, from none to considerable (Kernis, 2005) or a slowly varying mean over daily events and across situations (Ninot et al., 2001; Ninot et al., 2005). Stability in these dimensions creates stable behaviors and psychological reactions (McCrae and Costa, 1994; Mortimer et al., 1982). Stable self-perceptions reflect self-consistency with the development of feelings of unity, independence, predictability and control (Epstein, 1979). Inversely, individuals with unstable self-esteem often experience anger and hostility (Kernis et al., 1991). Unstable self-esteem also reveals interesting information about depression (Greenier et al., 1999; Kernis et al., 1991; Oosterwegel et al., 2001) and paranoia (Thewissen et al., 2008). Patients with COPD can experience unpredictable exacerbations such as increased dyspnoea, wheezing, cough, sputum production (Madison and Irwin, 1998). These symptoms, particularly dyspnoea, may interfere with the maintenance of stable auto-evaluative patterns and significantly raise anxiety (Borak et al., 1991; Karajgi et al., 1990; Withers et al., 1999). No study, however, has yet to investigate the stability of global self-esteem or physical self in patients with COPD.

The purpose of the present study was to compare the level and stability of self-esteem and physical self in patients with COPD and healthy adults over a three-week period through the analysis of day-to-day time series. We suspect that the irregular symptoms of a chronic respiratory disease powerfully influence the stability of these perceived dimensions over time. We supposed that the mean scores of global self-esteem and physical self and stability indices would be lower in COPD patients than in healthy adults.

## 1. Method

### 1.1. Participants

Fifty-eight adults assigned to two groups participated in this study (Table 1). The first group comprised 27 patients with stable and moderate COPD (from 46 to 74 years old). The other group served as control and was composed of 31 adults (from 48 to 73 years old). The control group was used to determine whether the perceived dimensions in “healthy” adults exhibit lower fluctuations (standard deviation and range), and higher levels as compared with those of COPD patients. Patients with moderate COPD were consecutively recruited from three regional hospitals where they had just benefited from their first exercise test. Inclusion criteria were as follows: a post-bronchodilator forced

Table 1  
Characteristics of participants.

Variable	COPD	Healthy
<i>N</i>	27	31
Gender (W/M)	10/17	11/20
Age ( <i>M</i> ± <i>S.D.</i> )	63.0 ± 7.3	65.1 ± 7.1
FEV <sub>1</sub> % ( <i>M</i> ± <i>S.D.</i> )	54.0 ± 12.0#	–
FEV <sub>1</sub> /FVC% ( <i>M</i> ± <i>S.D.</i> )	61.3 ± 15.1☒	–
Weight (kg) ( <i>M</i> ± <i>S.D.</i> )	72.4 ± 12.6	68.0 ± 8.9
Height (cm) ( <i>M</i> ± <i>S.D.</i> )	166.4 ± 5.3	168.4 ± 4.1

Note: FEV<sub>1</sub>: forced expiratory volume in 1 s; FVC: forced volume capacity; #, min = 30% and max = 74%; ☒: min = 30% and max = 81%.

expiratory volume in one second (FEV<sub>1</sub>)/forced vital capacity (FVC) < 0.7 and an FEV<sub>1</sub> 30–79% predicted, no indication for home oxygen therapy, and no exacerbation or hospitalization in the previous two months. The study was approved by the medical ethics committees of all three hospitals. Healthy subjects were consecutively recruited during conference of health primary prevention. None of them had pharmacologically treated psychiatric disorders or acute medical illnesses and none were facing major negative life events that would have affected psychological function over the three-week period. All subjects gave informed written consent to participate. This instrument was proven to reproduce the hierarchical structure of the corresponding multi-item inventories using correlations and partial correlations, factor analysis and confirmatory factor analysis (Fox and Corbin, 1989; Ninot et al., 2000), as well as for its external validity (Fox and Corbin, 1989).

### 1.2. Measures

To assess day-to-day dynamics, the instrument needed to be short (quick assessment to maintain motivation), easy to complete (single sheet of paper, weekly journal, software), sensitive (for example, visual analog scale), reliable (consistent with other measuring instruments) and valid (predictive, concurrent). A single-item provides an adequate measure of global self-esteem because most adults are schematic for self-esteem (Robins et al., 2001), and physical self (Ninot et al., 2001). Thus, these perceived dimensions are likely to be repeatedly activated in a wide range of situations and become chronically accessible by adulthood (Robins et al., 2001). The Physical Self Inventory-6 (PSI-6; Ninot et al., 2001), which measures global self-esteem, physical self-worth and four physical subdomains (physical condition, sport competence, physical strength and attractive body) with one item per dimension, has acceptable psychometric properties (Table 2). The participants responded to this inventory using a visual analog scale (a single 10-cm horizontal line without formal indications is drawn under each item) that ranged from “not at all” (measured 0.0 cm) to “absolutely” (measured 10.0 cm). Ninot et al. (2001) validated this tool specifically designed to allow repeated administration and reveal variability in self-esteem and physical self. This instrument was proven to reproduce the hierarchical structure of the corresponding multi-item inventories using correlations and partial correlations, factor analysis and confirmatory factor analysis

Table 2  
Items of the Physical Self Inventory (Ninot et al., 2001).

Category	Item
Global self-esteem	You have a good opinion of yourself
Physical self-worth	Physically, you are proud of who you are and what you can do
Physical condition	You should do well in an endurance test
Physical strength	When you come upon situations requiring strength, you are among the first to step forward
Sport competence	You think you are good in all sports
Attractive body	You think that you have a body pleasant to look at

(Fox and Corbin, 1989; Ninot et al., 2000), as well as for its external validity (Fox and Corbin, 1989). For the COPD group, a specific item about dyspnoea was added with the same response mode, from 0.0 for “no breathlessness” to 10.0 for “maximal breathlessness”. They were also requested to draw a mark on the center of a second 10-cm horizontal visual analog scale. This additive item was designated to estimate the measurement error, which corresponded to the difference between the true value of the center of the line (i.e., 5 cm) and the value of the response mark.

### 1.3. Procedure

Each participant completed an inventory on a single page of a personal notepad twice a day between 7:00 and 9:00 (AM and PM) over a three-week period. Each page included the six items of the PSI-6, plus the dyspnoea item for the COPD group, presented in random order. Individual time series were then composed of 42 observations per dimension. The participants based their responses on how they felt at the moment they were completing each form. They assessed their immediate, contextually based feelings of self-perception. They were not allowed to consult their previous responses.

### 1.4. Statistical analyses

Three dependent variables were computed for each individual time series: the mean value, the standard deviation and the range (defined as the difference between the highest and lowest values of the time series). Multivariate analyses of variance (MANOVAs) were used to test the global Group (2) effect on the PSI-6 dimensions. When MANOVAs were significant, univariate analyses of variance (ANOVA) were performed to determine which dimensions were significantly affected. The dyspnoea item for the COPD group was treated separately by analysis of the Pearson’s correlations between this item and the six dimensions of the inventory.

## 2. Results

### 2.1. Mean values

There were no significant differences between the two groups on age ( $p = .26$ ), height ( $p = .46$ ) and weight ( $p = .13$ ) using  $t$ -test,

Table 3  
Means of Global Self-Esteem (GSE), Physical Self-Worth (PSW), Physical Condition (PC), Sport Competence (SC), Attractive Body (AB), Physical Strength (PS) and Measure Error (ME) over a three-week period (referring between-persons).

	COPD		Healthy		$F(1,2)$	$p$
	$M$	$S.D.$	$M$	$S.D.$		
GSE	4.69	1.94	7.13	1.47	28.01	<0.000
PSW	3.93	1.70	6.88	1.50	46.56	<0.000
PC	3.48	1.67	6.51	1.53	49.09	<0.000
SC	3.60	1.73	6.27	2.04	27.12	<0.000
AB	4.27	2.05	6.92	1.61	29.47	<0.000
PS	3.43	1.73	6.78	1.57	56.43	<0.000
ME	5.01	0.08	5.03	0.13	0.46	0.41

COPD: chronic obstructive pulmonary disease.

and gender using  $\chi^2$  statistic ( $p = .90$ ). The MANOVA revealed a significant Group effect on the mean values of perceived PSI-6 dimensions (Wilks’ Lambda = 0.44,  $R/Rao = 10.82$ ,  $p < .0001$ ). Subsequent univariate analyses showed that the Group effect was significant for all dimensions and not for the measure error item (Table 3). The results showed that COPD patients scored significantly lower than the “healthy” group on the six perceived dimensions.

The mean correlations between dyspnoea and the PSI-6 dimensions for the 26 COPD patients were, respectively:

- global self-esteem:  $-0.09$ ;
- physical self-worth:  $-0.17$ ;
- physical condition:  $-0.18$ ;
- sport competence:  $-0.19$ ;
- attractive body:  $-0.14$ ;
- physical strength:  $-0.21$ .

As a global illustration of these results (random selection), an individual physical self-worth series from each of the two groups is plotted in Fig. 1. The Fig. 2 shows time series of global self-esteem, perceived physical condition and dyspnoea of one

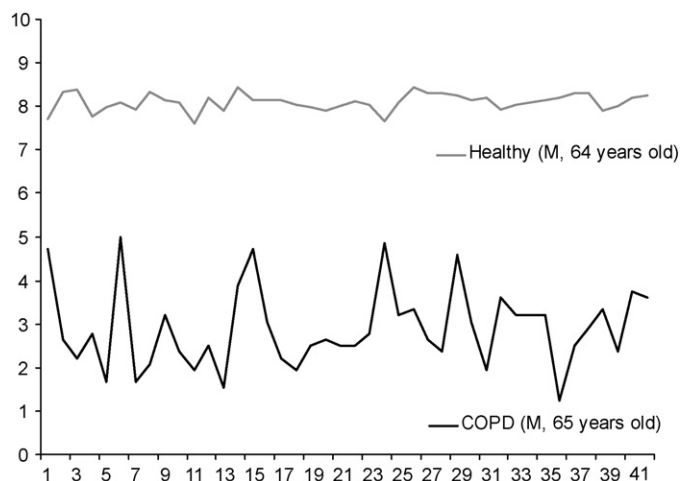


Fig. 1. Changes in physical self-worth in two participants over a three-week period (two measures per day).

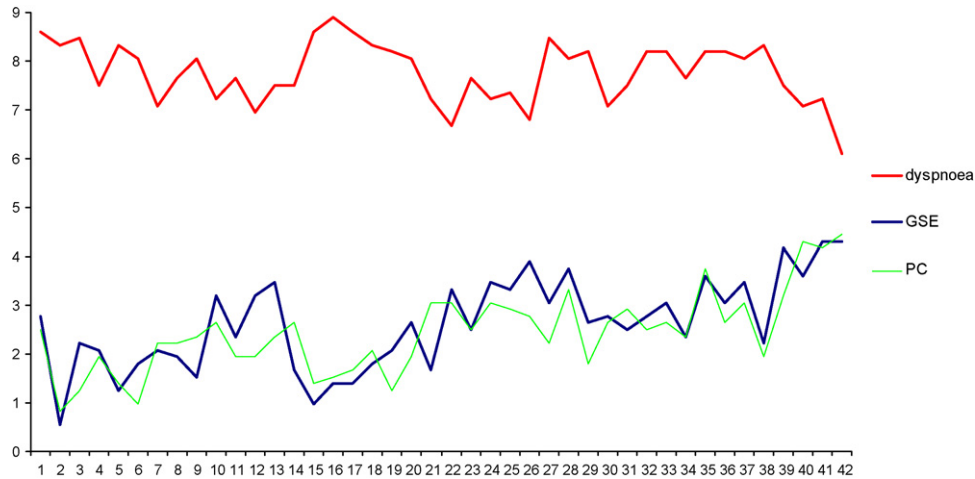


Fig. 2. Changes in Global Self-Esteem (GSE), perceived Physical Condition (PC) and dyspnoea in one chronic obstructive pulmonary disease (COPD) patient over a three-week period (Pearson's correlation coefficient between GSE and Dyspnoea,  $-0.54$ ; between PC and dyspnoea,  $-0.60$ ; between GSE and PC,  $0.78$ ).

COPD patient and Pearson's correlation coefficients between these time series.

## 2.2. Standard deviation

The MANOVA showed a significant overall Group effect on the PSI-6 dimensions (Wilks' Lambda =  $0.65$ ,  $R/Rao = 4.47$ ,  $p = .001$ ). Univariate analyses showed that all dimensions contributed significantly to the overall effect (Table 4). The tests evidenced that the time series of the COPD patients were significantly more varied than those of the "healthy" group for all perceived dimensions.

## 2.3. Range

The MANOVA revealed a significant overall Group effect (Wilks' Lambda =  $0.64$ ,  $R/Rao = 4.82$ ,  $p < .001$ ). Univariate ANOVAs showed that all dimensions contributed to this overall effect (Table 5). The tests indicated that the COPD patients had a wider response range than the "healthy" group for all perceived dimensions.

Table 4  
Standard deviations (S.D.) of Global Self-Esteem (GSE), Physical Self-Worth (PSW), Physical Condition (PC), Sport Competence (SC), Attractive Body (AB), Physical Strength (PS) and Measure Error (ME) over a three-week period (referring within-persons).

	COPD		Healthy		$F(1,2)$	$p$
	$M$	$S.D.$	$M$	$S.D.$		
GSE	0.97	0.44	0.55	0.25	19.23	<0.001
PSW	0.98	0.44	0.57	0.29	17.85	<0.001
PC	0.94	0.51	0.64	0.34	6.81	0.011
SC	0.97	0.47	0.56	0.37	13.33	<0.001
AB	0.80	0.41	0.52	0.31	8.10	0.004
PS	0.91	0.45	0.59	0.29	10.72	0.002
ME	0.15	0.05	0.13	0.04	1.96	0.167

COPD: chronic obstructive pulmonary disease.

Table 5

Ranges of Global Self-Esteem (GSE), Physical Self-Worth (PSW), Physical Condition (PC), Sport Competence (SC), Attractive Body (AB), Physical Strength (PS) and Measure Error (ME) over a three-week period (referring within-persons).

	COPD		Healthy		$F(1,2)$	$p$
	$M$	$S.D.$	$M$	$S.D.$		
GSE	4.23	1.75	2.45	1.14	20.57	<0.001
PSW	4.27	1.75	2.44	1.21	21.53	<0.001
PC	4.08	2.08	2.78	1.64	6.86	0.011
SC	4.25	2.02	2.48	1.49	14.03	<0.001
AB	3.88	1.83	2.34	1.49	10.96	0.002
PS	3.84	1.61	2.55	1.29	10.95	0.002
ME	0.62	0.22	0.55	0.18	1.80	0.185

COPD: chronic obstructive pulmonary disease.

## 3. Discussion

This study showed lower mean scores for global self-esteem, physical self-worth and each of the physical self subdomains over a period of three weeks in patients with moderate COPD as compared with "healthy" adults. Moreover, the patients showed less stability in scores for global self-esteem, physical self-worth, and the subdomains, over the same period. As in previous studies (Kersten, 1990; Moullec et al., 2008) and reviews (Hynninen et al., 2005; Maurer et al., 2008), these results support the hypothesis that individuals with moderate COPD present lower global self-esteem than "healthy" adults over time, as well as lower scores for physical self-worth and its subdomains.

COPD negatively affects the entire perception system related to physical abilities. This negative effect is classically observed in disabled persons living in an ordinary environment (Sherrill, 1997). The low level of perceived physical ability in the COPD group indicated that the patients recognized their deteriorated health status, due to chronic lack of energy, repeated symptom exacerbation, and probably the poor prognosis for this incurable disease. The higher correlations between dyspnoea and the physical ability subdomains, as compared with global self-esteem,

support this explanation. They raise important questions about the psychological mechanisms that operate in the hierarchical structure between physical self and global self-esteem once a patient has fully understood his or her diagnosis (and the long-term prognosis). The knowledge and psychological integration of the biopsychosocial consequences of COPD could increase self-depreciation. COPD is usually caused by tobacco smoking (Calverley, 2000; Madison and Irwin, 1998). When it is diagnosed, the implications are unmistakable – the individual’s own behavior has to a great extent caused the disease – and this may lead to feelings of guilt. Moreover, comparing the present physical status with memories of satisfying physical capacities of few years previous and the status of healthy peers further decreases global self-esteem. A low perception of physical abilities affects global self-esteem by overgeneralization (Kernis et al., 1989).

The results showed that global self-esteem, physical self-worth and the physical subdomains were less stable in moderate COPD patients than in same-age “healthy” adults: these dimensions exhibited higher fluctuations (standard deviation and range) in the COPD patients, indicating that they resist, less effectively to several endogenous and exogenous constraints. In other words, the patients seemed to be more sensitive to their health status and environmental change. Many patients with COPD find it difficult to cope with the distressing symptom of breathlessness (Ries et al., 1995). They are subjected to other unpredictable, frightening and disabling symptoms that make it hard to feel in control of their lives. Many patients develop a lack of confidence in their ability to avoid breathing difficulties while participating in certain activities, however minimal the physical demands of the activity may be (Wigal et al., 1991). Over time, a vicious circle of physical deconditioning caused by activity restriction (Young, 1983), and, as our study indicates, “psychological” deconditioning related to exercise, thus results in the patients no longer knowing the exact limits of their physical abilities. They then begin to increasingly rely on passive coping mechanisms, which may explain why overall behavior is slowed down with depression or anxiety (Dantchev and Wildlöcher, 1998). Further studies are needed to determine whether the heightened instability of global self-esteem and physical self in moderate COPD patients follow a specific dynamics. Greenier et al. (1999) stated that instability in these dimensions has “psychological” meaning: it both promotes and is a product of the fragility of feelings of self-worth. This statement could contribute to explain why anxiety, health status and depression increase the risk for hospital re-admission in COPD patients (Maurer et al., 2008).

We can also suggest that the instability of physical self could depict the importance attributed by COPD to body domain, as a consequence of physical symptoms. It could support the assumption of Kernis et al. (1993), who suggested that the more importance people place on physical competence as determinants of overall self-worth, the more these feelings of self-worth fluctuate.

A limitation must be mentioned. Single-item measuring certain psychological dimensions can provide an acceptable balance between practical needs and psychometric concerns (Robins et al., 2001). Single-item self-report scales are not

necessary relevant for assessing all kinds of psychological dimensions. For example, it is unlikely that a single-item would be valid for a multifaceted and psychodynamically complex structure. According to Robins et al. (2001), a single self-report item may be adequate when the construct is highly schematized for most individuals. Most adults are schematic for global self-esteem and physical self because such dimensions are likely to be activated in a wide range of situations and, therefore, likely to be chronically accessible to adulthood (Robins et al., 2001). Nevertheless, further studies are needed to determine the signal/noise ratio and the validity of a single-item measure.

In conclusion, this three-week study highlighted lower mean score of global self-esteem and physical self, and greater instability in these scores, in patients with moderate COPD as compared with “healthy” adults. The findings support the assertion that unstable global self-esteem or physical self reflects a certain vulnerability to the impact of the impact of COPD and its characteristics (Kernis et al., 1993; Greenier et al., 1999; Nezlek, 2002; Maurer et al., 2008). Combined with the lower scores, the greater fluctuation in scoring by COPD patients indicated that their global self-esteem and physical self, considered as a complex system, did not cope efficiently with several endogenous and exogenous constraints. These two characteristics of self-esteem and physical self should be routinely measured and taken into account for part of the patient’s treatment plan is to decrease anxiety or depressive symptoms (Ries et al., 1995). Researches are needed to determine the influence of other domain of competence on global self-esteem and to examine the relation between physical self and perceived health status, and between self-esteem and well being or quality of life.

Fluctuations across multiple assessments of daily self-perceptions reflect meaningful psychological processes (Greenier et al., 1999; Nowak et al., 2000). Further studies are needed to discover the principles that govern the emergence of order in complex systems such as self-esteem over time.

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