

76 5. Estimated nocturnal sleep impairment in patients with COPD in daily life and its association with daytime physical activity

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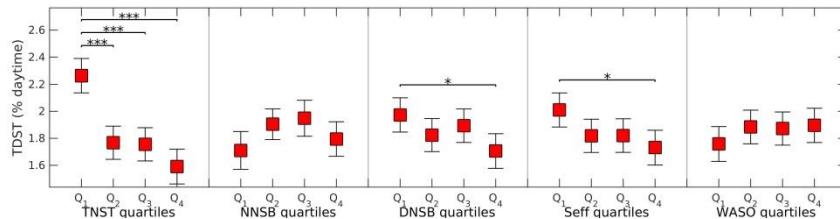


Figure 35 Association between nocturnal sleep parameters (TNST = Total Night Sleeping Time; NNSB = Number of Nocturnal Sleeping Bouts; DNSB = average Duration of Nocturnal Sleeping Bouts; Seff = Sleep efficiency; WASO = time aWake After the first Sleep Onset) and Total Day Sleeping Time (TDST). Data are expressed as least-square means  $\pm$  standard error. Significance levels for pairwise comparisons are indicated as horizontal bars with \* $=p<0.05$ , \*\* $=p<0.01$ , and \*\*\* $=p<0.001$ . TDST is presented in % of the out of bed time.

## 5.5 Discussion

We describe, to our knowledge, the first study in a large sample of participants with COPD, targeting the association of objectively measured sleep impairment with airflow limitation, exertional dyspnoea, gender, day group and daytime activity levels.

We found that objective sleep quality measures are worse in patients with severe airway obstruction and dyspnoea. This is in agreement with George et al. [111] who showed that subjective sleep disturbances tend to be more severe with advancing disease and with Dodge et al. [112] who showed that patients with dyspnoea are more likely to report persistent sleep disturbance. Conversely, Hartman et al. [99] failed to find a significant association between night's rest parameters assessed by an accelerometer and both airflow limitation and dyspnoea. However, this latter study did not evaluate sleep quality measures, but rather quantitative parameters such as body movements and number of posture transitions that are not necessarily related to poor sleep quality [99]. Nunes et al. [98] reported that the MMRC score was an important predictor of objectively measured sleep quality in 26 patients with moderate to very severe COPD. However, the small sample size precluded any firm conclusions on the differences between patients with different dyspnoea scores. Furthermore, in this study patient's daily sleep logs were used. This may be problematic because sleep logs are imprecise in quantifying time in bed and wake time [113].

The strong evidence provided by our findings regarding the association of sleep impairment with the most severe stage of the disease and dyspnoea could be explained by at least two mechanisms. The lying sleeping position assumed by the participants in the study increases both work of breathing and airway resistance, and lowers their threshold for dyspnoea [114]. Moreover, patients with severe COPD frequently experience episodes of worsening symptoms that may also preclude from adequate sleep. It has been shown that one night of sleep deprivation can lead to small but statistically significant falls in FEV<sub>1</sub> and forced vital capacity in a group of patients with COPD [115]. Although a single night's loss of sleep does not have major clinical consequences, it may be speculated that chronic alterations in sleep would result in cumulative negative effects on the respiratory function, which could become relevant along the prolonged course of this disorder because they occur more likely for those patients who are least able to tolerate any further challenge to their ventilatory capability.

Participants with the most severe disease had worse sleep but they did not seem to compensate it during the day by adding naps. Most dyspnoeic patients, in turn, seemed to do so.