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## **Executive control of attention in sleep apnea patients: theoretical concepts and methodological considerations.**

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Sleep apnea patients' nocturnal breathing disturbances cause daytime sleepiness and cognitive impairments. Attentional capacity and vigilance deficits have often been observed. Moreover, some studies have suggested executive dysfunction, usually assumed to be related to (pre)frontal lobe dysfunction caused by intermittent hypoxemia. However, sleep disruption itself has a pervasive influence on cognitive function and affects not only underlying 'lower-level' processes such as arousal and alertness, but also 'higher-level' cognitive processes such as executive attention. This methodological caveat has not been fully taken into account in the sleep apnea literature. In order to be able to disentangle these cognitive processes on different levels, sound theoretical neurocognitive frameworks are needed to attain careful analyses and interpretations of neuropsychological data. Therefore, this paper firstly presents an overview of relevant theoretical concepts and models of arousal, attention, and executive function. Then, it is being argued that these theoretical considerations have important methodological implications. These methodological concerns are being addressed by specific experimental and statistical approaches, illustrated by some well-known neuropsychological tests. It can be concluded that the reported executive deficits in sleep apnea patients should be regarded as tentative, and that more case-controlled studies are needed using fine-grained analyses to parcel complex cognitive abilities into their subcomponents. Copyright 2004 Elsevier Ltd.

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