

RESEARCH ARTICLE

Night-to-night variation in sleep associates with day-to-day variation in vigilance, cognition, memory, and behavioral problems in Alzheimer's disease

Sara Balouch^{1,2} | Dylan A.D. Dijk³ | Jennifer Rusted⁴ | Simon S. Skene³ |
Naji Tabet¹ | Derk-Jan Dijk^{5,6}

¹Centre for Dementia Studies, Brighton & Sussex Medical School, Brighton, UK

²School of Humanities and Social Science, University of Brighton, Brighton, UK

³Surrey Clinical Trials Unit, Department of Clinical and Experimental Medicine, University of Surrey, Guildford, UK

⁴School of Psychology, University of Sussex, Brighton, UK

⁵Surrey Sleep Research Centre, Department of Clinical and Experimental Medicine, University of Surrey, Guildford, UK

⁶UK Dementia Research Institute, Care Research and Technology Centre, Imperial College London and the University of Surrey, Guildford, UK

Correspondence

Sara Balouch, 232 Watson Building, School of Humanities and Social Science, University of Brighton, Falmer, Brighton, UK.
E-mail: s.balouch@brighton.ac.uk

Abstract

Introduction: Sleep disturbances are commonly reported in people living with Alzheimer's disease (AD), but it is currently unknown whether night-to-night variation in sleep predicts day-to-day variation in vigilance, cognition, mood, and behavior (daytime measures).

Methods: Subjective and objective sleep and daytime measures were collected daily for 2 weeks in 15 participants with mild AD, eight participants with mild cognitive impairment (MCI), and 22 participants with no cognitive impairment (NCI). Associations between daytime measures and four principal components of sleep (duration, quality, continuity, and latency) were quantified using mixed-model regression.

Results: Sleepiness, alertness, contentedness, everyday memory errors, serial subtraction, and behavioral problems were predicted by at least one of the components of sleep, and in particular sleep duration and continuity. Associations between variations in sleep and daytime measures were linear or quadratic and often different between participants with AD and those with NCI.

Discussion: These findings imply that daytime functioning in people with AD may be improved by interventions that target sleep continuity.

KEYWORDS

actigraphy, Alzheimer's disease, behavior, cognition, dementia, memory, mild cognitive impairment, mood, older adults, sleep, vigilance

1 | BACKGROUND

Sleep disturbances, quantified through self-report, carer report, actigraphy, or polysomnography, are highly prevalent in people living with mild cognitive impairment (MCI) and Alzheimer's disease (AD), and contribute to quality of life and caregiver burden.^{1,2} These sleep disturbances include early sleep timing, long sleep periods, frequent awakenings, nocturnal wandering, reduced rapid eye movement and slow wave sleep, sleep-related breathing disorders, and excessive daytime sleepi-

ness, as well as long naps.²⁻⁶ Cross-sectional and longitudinal studies indicate that sleep disturbances are predictive of AD before AD symptoms emerge and are associated with AD pathology.^{7,8} Based on these and other studies, a bidirectional link between sleep disturbances and cognitive decline has been suggested.^{9,10}

The extent to which sleep disturbances associate with AD symptoms on shorter timescales has received less attention.¹¹ Symptoms in AD vary from day-to-day and contribute to variation in caregiver burden.^{12,13} More variable sleep duration has been associated with

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