REM-SLEEP, THE REGULATION OF SELF-CONSCIOUS EMOTION AND HYPERAROUSAL IN PSYCHOPHYSIOLOGICAL INSOMNIA

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Objectives: The incorporation of emotional daytime waking experiences in subsequent dreams has continued to inspire the field of psychophysiological research. Recent studies indeed show that rapid eye movement (REM) sleep – the part of sleep that supports the most vivid dreams - aids the resolution of emotional conflict. The present project investigates whether the chronically disturbed REM sleep that characterizes insomnia could interfere with the overnight resolution of distress from self-conscious emotions. We moreover hypothesize that this deficit could result in an accumulation of the concomitant signs of distress in the autonomic, neuroendocrine and central nervous system, which has commonly been described as ‘hyperarousal’ and is the key finding in insomnia.

Method: Participants (N = 1,199) completed questionnaires on insomnia severity, hyperarousal, self-conscious emotional distress, and thought-like nocturnal mentation that was validated to be a specific proxy for restless REM sleep (selective fragmentation \( R = 0.57, P < 0.001 \), eye movement density \( R = 0.46, P < 0.01 \)) in 32 polysomnographically assessed participants.

Results: The experience of distress lasting overnight increased with insomnia severity \( (\beta = 0.29, P < 10^{-23}) \), whereas short-lasting distress did not \( (\beta = -0.02, P = 0.41) \). Insomnia severity was associated with hyperarousal \( (\beta = 0.47, P < 10^{-63}) \) and with the thought-like nocturnal mentation that is specifically associated with restless REM sleep \( (\beta = 0.31, P < 10^{-26}) \). Structural equation modeling showed that 62.4% of the association between these key characteristics of insomnia was mediated specifically by reduced overnight resolution of emotional distress. The model outperformed all alternative mediation pathways.

Conclusions: The findings suggest that restless REM sleep reflects a process that interferes with the overnight resolution of distress. Its accumulation promotes developing chronic hyperarousal, giving clinical relevance to the role of REM sleep in emotion regulation in insomnia, depression and post-traumatic stress disorder. We are currently investigating brain mechanisms underlying the findings, by means of high density sleep EEG, odor-tagged targeted memory reactivation of wake emotional experiences during subsequent sleep, and fMRI during repeated exposures.

Keywords: Psychophysiological insomnia, Selfconscious emotion, REM-sleep, Sleep fragmentation, Sleep arousals, Distress, Hyperarousal
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