Mental Fatigue in Older Adults: A Narrative Review of Subjective, Behavioral, Neurophysiological, and Physical Changes.

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Résumé

Mental fatigue (MF) is a frequently reported symptom among older adults and has been identified as contributing to cognitive and physical decline with advancing age. Despite the well-documented impacts of MF on young adults, its specific effects on older populations remain unclear. This review aims to synthesize current evidence on the impact of MF in older adults, focusing on subjective experiences, behavioral changes, neurophysiological mechanisms, and physical outcomes, including balance and motor function.
A systematic search of PubMed, Web of Science, and PsycINFO databases identified 28 experimental studies involving participants aged 55 and above, with some studies including younger groups for comparison. MF was experimentally induced using cognitive tasks such as the Stroop task, N-back task, or combinations, with durations ranging from 7 to 180 minutes. Subjective, behavioral, physiological, and balance-related outcomes were extracted and analyzed.

Subjective outcomes were consistent across studies: all reported increased perceived MF following cognitively demanding tasks, regardless of protocol type or duration. This increase was similar between young and older participants, although greater interindividual variability was observed in older adults. Breaks within tasks were associated with attenuated fatigue perception.

Behavioral findings were more heterogeneous. While many studies found increased reaction times and decreased accuracy in older adults post task, others showed maintained or even improved performance. Outcome variability was linked to task type, duration, and participant motivation differences. Older participants often exhibited slower processing but greater task engagement than younger adults, possibly reflecting age-related compensatory strategies.

Neurophysiological evidence supports the hypothesis of cortical involvement in MF development. Electroencephalography studies revealed increases in frontal alpha and theta power in older adults, suggesting changes in attentional and cognitive control networks. Unlike young adults, who often showed reductions in P3 amplitude (interpreted as cognitive disengagement), older adults exhibited prolonged P3 latencies, indicative of slower information processing. Functional magnetic resonance imaging and near infrared spectroscopy

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studies highlighted decreased prefrontal activity and reduced corticostriatal connectivity following MF, consistent with impairments in executive function and motor control integration.

Physical and neuromuscular outcomes demonstrated decreased maximal voluntary contraction post MF, with little effect on muscular endurance. These strength reductions were not attributed to peripheral fatigue but to central (supraspinal) mechanisms, as supported by transcranial magnetic stimulation studies showing increased cortical inhibition.

Balance-related measures revealed that MF negatively impacts postural control in older adults, increasing postural sway and modifying gait parameters, especially under dual-task conditions. However, standard clinical functional tests (e.g., Timed Up and Go, 6-minute walk test) remained largely unaffected. These findings suggest that MF-induced attentional decline compromises complex motor tasks without overtly impairing gross motor function.

In conclusion, MF consistently elevates subjective fatigue and alters cognitive, neural, and motor functions in older adults. However, the magnitude and nature of these effects vary depending on individual factors and task characteristics. Notably, older adults may engage distinct compensatory mechanisms-such as greater cortical recruitment-to maintain performance under fatigue. These adaptations differ from the cognitive disengagement strategies observed in younger adults.
Emerging evidence suggests that physical and cognitive training interventions may mitigate the effects of MF in older populations. For instance, brain endurance training, which combines mental and physical exercises, has shown promise in reducing MF-related performance declines. Future research should explore the moderating role of physical activity levels and investigate long-term strategies to preserve cognitive-motor function in aging individuals.