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The impact of executive functioning and age-related cognitive decline on distraction from pain

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Older people, suffering from pain and its consequences more often than younger people, would benefit significantly from non-pharmacological pain treatment. So far, little is known about how age affects psychological pain modulation strategies. Preliminary findings hint towards a less efficient pain inhibition through cognition-based pain modulation strategies, as cognitive distraction from pain. Here, executive functions (EFs) have been considered a key factor in the age – pain relationship, with age-related cognitive decline in EFs being associated with reduced pain relief through distraction in older adults.

We investigated influence of four core EFs on distraction from pain in aging. In a two-session design, healthy young (18-30 years) and older participants (60+ years) performed a Go-Nogo task, the Stroop-Color-Word-Task, the Sternberg-Task, and the Attentional Network Task. Afterwards, participants performed a pain distraction task, namely a n-Back working memory task with low and high cognitive load, during which participants received individually adjusted transdermal electrical pulse trains in non-painful and moderately painful intensities to the inner forearm. Ratings of intensity and unpleasantness were collected and stimulus-related (EF tasks) and pain-related evoked potentials were recorded with a 64-channel EEG. Unexpectedly, first analyses on the currently small sample suggest a more efficient pain relief through distraction under low relative to high cognitive load in older adults. The distraction effect was related to EFs, some of which showed age-related cognitive impairment. Our findings could lead to a better understanding how to adapt pain treatments in this population by including selective cognitive trainings and optimizing distraction task difficulty.

Keywords: *aging, pain modulation, distraction from pain, executive functions, age-related cognitive decline, EEG, ERP*

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