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COMMENTARY

Creative expression in mild cognitive impairment: beyond neurocognitive benefits

Commentary on "The effect of creative expression program in neurocognitive networks performance measured by task and resting-state functional MRI" by Zhao *et al.*

Mei Zhao[1,2] and Huali Wang[2,3,4]

[1]*Beijing Haidian Psychological Rehabilitation Hospital, Beijing, China*
[2]*Dementia Care and Research Center, Peking University Institute of Mental Health (Sixth Hospital), Beijing, China*
[3]*Beijing Municipal Key Laboratory for the Translational Research on Diagnosis and Treatment of Dementia, Beijing, China*
[4]*NHC Key Laboratory of Mental Health, National Clinical Research Center for Mental Disorders, Peking University, Beijing, China*
Email: huali_wang@bjmu.edu.cn

Mild cognitive impairment (MCI), a transitional stage from healthy cognition to dementia, has emerged as the focus of dementia prevention (Crous-Bou *et al.*, 2017). Researchers have focused on discovering disease-modifying therapies and nonpharmacological approaches, aiming to slow cognitive decline and preserve the social function of those with mild cognitive deficits (Cummings *et al.*, 2022; Teixeira *et al.*, 2012). Among the different nonpharmacological interventions, cognitive training and lifestyle promotion approaches have been extensively investigated (Kivipelto *et al.*, 2018; Ngandu *et al.*, 2015; Sherman *et al.*, 2020). In recent years, other interventions, such as enhancing social interaction, emotional intelligence, and wisdom, are receiving more and more attention (Delhom *et al.*, 2022; Lee *et al.*, 2020).

In the current issue of *International Psychogeriatrics*, Zhao and colleagues reported that a 25-session creative expression intervention may shape the brain function of individuals with MCI (Zhao *et al.*, 2022). Using task-related functional magnetic resonance imaging (fMRI), researchers observed an increased brain activation in the right anterior cingulate gyrus, the right middle frontal gyrus, the right lentiform nucleus, the left hippocampus, the left middle occipital gyrus, and the left cerebellum posterior lobe in the intervention group. Meanwhile, the resting-state fMRI data demonstrated increased functional connectivity between the left hippocampus and bilateral angular gyrus, right inferior temporal gyrus, right superior occipital gyrus, and left middle frontal gyrus in MCI after the intervention. In contrast, brain activation and functional connectivity were not altered in the control group. These exciting findings might enlighten us to explore the multifaceted benefit of creative expression in neurocognitive disorders.

Creative expression intervention usually involves art activities such as drawing, storytelling, and group discussion, as Zhao *et al.* (2022) designed. The cognitive stimulating training program is another nonpharmacology intervention based on the theory of "use it or lose it." Similarly, it engages persons with dementia in enjoyable cognitive activities delivered in a small group, aiming to stimulate a range of cognitive skills in a social setting (Spector *et al.*, 2003). One of the significant differences between these two types of interventions lies in the involvement of creativity, which is the core capacity required for creative expression tasks. Creativity is composed of diverse dimensions such as originality, fluency, or flexibility (Sampedro *et al.*, 2020). An earlier study suggested that, in patients with schizophrenia, creativity was associated with neurocognitive function and social cognition, such as working memory, cognitive flexibility, and theory of mind (Sampedro *et al.*, 2020). Therefore, from the neural plasticity hypothesis, the observation that creative expression may increase brain activation and functional connectivity in the hippocampus and frontal gyrus might partly help us understand the neural substrates of creative expression on enhancing cognitive function in MCI.

Interestingly, we notice that the brain regions, such as the occipital gyrus and cerebellum lobe, were also more activated after creative expression training (Zhao *et al.*, 2022). These regions were primarily

involved in sensory and motor processing, which is also required to fulfill creative tasks. For example, when drawing, a person must differentiate colors, lines, and textures and coordinate fine eye-to-hand movements. One recent study showed that cortical thinning in the sensory cortex might be associated with the severity of disruptive behaviors in Alzheimer's disease (Xiong *et al.*, 2022). On the other hand, previous studies have demonstrated its advantages in relieving depression and improving interpersonal communication (Fritsch *et al.*, 2009; Phillips *et al.*, 2010). Therefore, we wonder whether a creative expression program could also benefit behavior management in neurocognitive disorders by balancing sensory stimuli and coordinating muscle tones and movements.

Therefore, the brain imaging study by Zhao and colleagues intrigues us to explore further cognitive and behavioral benefits of creative expression in MCI. In particular, the following issues need to be addressed further.

First, Zhao and colleagues did not provide sufficient details to help interpret the associations among creative expression, cognitive function, and brain network (Zhao *et al.*, 2022). As discussed earlier, creative expression requires multiple skills and diverse cognitive and emotional processing capacities. Therefore, identifying specific beneficial activities of a single cognitive domain in creative expression intervention is not as easy as in cognitive training studies. Also, the diversity and flexibility of creative intervention might make investigations on its brain mechanism rather tricky. We shall foresee that, in the future, tools for high-resolution neural recordings will enable us to explore deeper. Also, the neural network theory will help us conceptualize how neural circuits function in mediating creative expression tasks (Khona and Fiete, 2022).

Second, even though fMRI is capable of measuring fluctuations or alterations in blood oxygen level-dependent (BOLD) signals during resting-state or cognitive tasks, different modeling approaches may lead to variations in the scale, size, complexity and connectivity patterns specific to pathological brain changes (Yang *et al.*, 2022). Therefore, the specificity of functional imaging features in measuring the effect of creative expression remains ambiguous. Nevertheless, the initial work of Zhao and colleagues has inspired us to consider the potential use of multiscale features to decode the recovery of disrupted topological organization in MCI brain networks.

Besides cognitive and emotional aspects, creative expression seeks to engage individuals in perceiving the cultural and social aspects of the self. Creativity is considered an essential human accomplishment and a sociocultural construct (Glăveanu, 2015). Life review and storytelling are usually included in the creative expression program. In these activities, participants are encouraged to think creatively and engage actively with other people verbally or physically (Phillips *et al.*, 2010). Also, emotion regulation during creative expression might mimic emotional intelligence intervention, increasing clarity and emotional repair (Delhom *et al.*, 2022). It remains unclear how a person perceives him- or herself in the specific sociocultural context. Besides, each culture has its metaphor which might be represented by local language and imagery figures (Creanza *et al.*, 2017). Previous behavioral experiments have suggested that music's expressivity may be derived from the evolutionary link between emotion and human dynamics (Sievers *et al.*, 2013). Therefore, we are also intrigued about the potential benefit of creative expression intervention for improving personal appraisal and interpersonal dynamics.

In all, the fMRI study by Zhao *et al.* reflects the potential neural substrates of the effect of creative expression intervention on mild cognitive impairment. Due to its nature, such as complexity and cultural diversity, the creative expression intervention may further benefit not only cognitive performance but also emotional, behavioral, and sociocultural adaptation. The convergence of these potential benefits must be reflected in the organization of the brain. Future research is warranted to explore the shared neural substrates of the linguistic, artistic, and sociocultural expressivity in creative expression intervention.

Conflict of interest

None.

Description of authors' roles

The authors equally contributed to the manuscript, revised, read, and approved the submitted version.

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