

Mental and Physical Activities Delay Cognitive Decline in Older Persons with Dementia

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Objectives: *To examine the effects of cognitive stimulation (mahjong) and physical exercise (tai chi [TC]) on cognitive performance in persons with dementia.*
Design: *Cluster-randomized open-label controlled design.* **Setting:** *Nursing homes.*
Participants: *One hundred ten residents, most of whom were cholinesterase-inhibitor naive. Inclusion criteria were Mini-Mental State Examination (MMSE) = 10–24 and suffering from at least very mild dementia (Clinical Dementia Rating \geq 0.5). Exclusion criteria were being bedbound, audio/visual impairment, regular activity participation before study, or contraindications for physical or group activities.*
Interventions: *Homes were randomized into three conditions (mahjong, TC, and simple handicrafts [control]). Activities were conducted three times weekly for 12 weeks.* **Measurements:** *Primary outcome was MMSE. Secondary outcomes were immediate/delayed recall, categorical fluency, and digit span. Various biological risk factors, including apolipoprotein E ϵ 4 allele, were included as covariates. Measures were collected at 0 (baseline), 3 (posttreatment), 6, and 9 months.*
Results: *Intent-to-treat analyses were performed using mixed-effects regression. Mahjong's effect varied by time for MMSE, delayed recall, and forward digit span. TC had similar effects but not for delayed recall. The typical pattern was that control participants deteriorated while mahjong and TC participants maintained their abilities over time, leading to enlarged treatment effects as time progressed. By 9 months, mahjong and TC differed from control by 4.5 points (95% confidence interval: 2.0–6.9; $d = 0.48$) and 3.7 points (95% confidence interval: 1.4–6.0; $d = 0.40$), respectively, on MMSE. No treatment effects were observed for immediate recall and backward digit span.* **Conclusions:** *Mahjong and TC can preserve*

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functioning or delay decline in certain cognitive domains, even in those with significant cognitive impairment. (Am J Geriatr Psychiatry 2014; 22:63–74)

Key Words: Cognitive decline, dementia, leisure activities, cluster-randomized controlled trial

Longitudinal studies show that leisure activities, especially mental and physical activities, mitigate cognitive decline. Although both physical and mentally stimulating activities are associated with cognitive performance, studies with up to 5 years' follow-up consistently show that among individuals who were cognitively intact at baseline, only mental activity independently predicts cognitive decline or incident dementia.^{1–3} It is important to note that those who are physically active also tend to be mentally active, and so, the effect of one activity may be masked by the other in survey studies. A recent randomized controlled trial of cognitive training (learning to use the computer), aerobic exercise, and a nil-treatment control did not reveal differences in the cognitive effects of cognitive training and exercise after the 6-month treatment,⁴ although the long-term effects were not tested. The therapeutic effects of these activities may be mediated through neuroplasticity,^{5,6} which may attenuate the effects of existing brain pathology, like white matter lesions, on cognitive performance.⁷

Despite encouraging results in healthy older adults, training programs for those with already significant cognitive decline have produced different results. Whereas physical activity has been found to be moderately effective for people with cognitive impairment or dementia,⁸ effects of cognitive training on such people have been disappointing.⁹ Nevertheless, cognitive training should not be confused with cognitive leisure activities. Cognitive training usually involves tasks tailor-made to tap specific functions, with limited generalizability to untrained domains.¹⁰ These tasks may be unfamiliar and uninteresting to the individual, and participation is difficult for those with low cognitive resources. In contrast, leisure activities are inherently pleasurable and more likely to draw interest and compliance. A recent study showed that active leisure pursuits in the cognitive (e.g., reading and solving crossword puzzles), but not physical, domain in the initial year or so after the diagnosis of Alzheimer disease was associated with

a slower cognitive decline, but activities in later years after diagnosis had no effect.¹¹ However, as with correlational studies, this study could not demonstrate causality and the fact that progressive dementia reduced activity participation in later years¹¹ made interpretation of the findings difficult. Unfortunately, no experimental study has been conducted on cognitive leisure activities. However, unlike cognitive training, due to the holistic nature of leisure activities, it is difficult to specify exactly which cognitive domains are being trained, and therefore, measures of global cognitive function would be more appropriate outcomes than specific cognitive abilities.

This study tested the effects of two leisure activities, mahjong (a game with 136–152 tiles that is similar to playing cards) and tai chi (TC), against a control in persons with very mild to moderate dementia. An earlier uncontrolled study suggested the efficacy of mahjong in improving the cognitive functions of nursing home residents with dementia,¹² but a randomized controlled trial is necessary for conclusions about causal effects to be made. Moreover, the cognitive effects of TC have never been investigated in individuals with this level of impairment, although a recent randomized controlled trial showed that it helped maintain Clinical Dementia Rating sum-of-box scores up to 1 year over a toning and stretching exercise group in able-bodied older adults with amnesic mild cognitive impairment or very mild dementia only.^{13,14} Thus, this was the first randomized controlled trial investigating the effects of these two activities simultaneously in persons with dementia. Mahjong and TC are popular mental and physical activities, respectively, in Chinese/Asian societies. Most, if not all, persons are well-exposed to these activities, although the degrees to which they master the skills vary. Due to space limitations, shortage of staff, and most importantly, management philosophies that favor maintenance and order but not therapeutic or quality-of-life issues,^{15–17} activity levels of residents in Hong Kong's nursing homes are typically very low,¹⁸ making it possible to introduce activity programs and

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