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LETTER

Leisure Activities for Mild Cognitive Impairment: Reconsidering an Intriguing Hypothesis Through a Methodological Lens [Letter]

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Dear editor

To date, no intervention has been proven to effectively prevent mild cognitive impairment (MCI) from progressing to dementia.[1] Nonetheless, several lifestyle strategies, including cognitive training, moderately intensive physical exercise, and dietary modification, demonstrate symptomatic benefits in MCI.[2] We therefore commend the recent systematic review and meta-analysis (SR/MA) by He et al,[3] which compares leisure activities with traditional cognitive rehabilitation training (TCRT) in improving memory, executive function, and quality of life (QoL) in MCI patients. While their work contributes valuable evidence, methodological limitations in design, implementation, and reporting need to be addressed to strengthen future studies.

Discrepancy Between Stated Objective and Study Design

He et al state that their SR/MA aims to "evaluate the efficacy of leisure activity intervention versus TCRT control on cognitive function in patients with varying degrees of cognitive impairment". This objective can be divided into two components.

Part 1 Concerns the Comparison of Cognitive Benefits Between Leisure Activities and TCRT

However, in defining the PICOS-based inclusion criteria, He et al allowed control groups beyond TCRT, including any non-leisure activity interventions or lower-frequency leisure activity interventions. As a result, the 20 randomized controlled trials (RCTs) included in their SR/MA employ over 10 types of controls, such as blank control, physiotherapy, acupuncture, range-of-motion exercises, repetitive transcranial magnetic stimulation (rTMS), health lectures, educational programs, handicrafts, pharmacotherapy (eg, Donepezil, Agomelatine, Dl-3-n-Butylphthalide), daily activities, TCRT, usual nursing care, and various combinations thereof.[3]

Furthermore, interventions in many included RCTs do not use leisure activities alone but combine them with other treatments, including virtual reality (VR)-based intervention with rTMS, VR-based intervention with acupuncture, or Dl-3-n-Butylphthalide/Agomelatine combined with board and card games.[3]

Owing to these complex and heterogeneous designs in both the intervention and control arms, the pooled effect sizes cannot isolate the relative efficacy of leisure activities versus TCRT—the central comparison the authors intend to make.

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Part 2 Addresses the Assessment of the Efficacy of Leisure Activity/TCRT Across Varying Severities of MCI

This requires stratified analyses, and when sufficient trials exist ($n \geq 5$), a dose-response meta-analysis should be performed.[4] Specifically, patients in the included RCTs should be stratified by cognitive impairment severity, with subgroup analyses estimating the effect size of leisure activities versus TCRT within each stratum. Since stratification discards continuous information, dose-response meta-analysis is necessary to generate dose-response curves and determine the gradient by which efficacy declines with increasing MCI severity. Unfortunately, He et al do not conduct these analyses, leaving their results unable to fully address the predefined research objective.

Compromised Interpretability: Issues in Subgroup Analysis and Effect Estimation

In the *Methods* section, He et al do not specify any intention to perform subgroup analyses, nor do they describe the corresponding methods. Despite this, their *Results* section presents subgroup analyses by leisure activity modality for each outcome. However, as previously noted, heterogeneous control interventions across the included RCTs undermine clinical comparability and diminish the interpretability of pooled effect estimates, rendering these subgroup findings of limited guidance for clinical utility.

In addition, we contend that a network meta-analysis would better serve their research objectives than the pairwise meta-analysis employed. Given the substantial diversity of leisure activity modalities, a network meta-analysis's cumulative ranking probabilities and league tables can establish an efficacy hierarchy.[5] This approach would enable direct comparison of the relative benefit of different leisure activity modalities and help identify which activity confers the greatest cognitive-rehabilitation effect for patients with MCI.

Domain-Specific Gaps: Language and Attention Measures Absent

Cognitive function comprises multiple domains, including perception, memory, learning, attention, decision-making, and language, which has led to the development of a wide range of assessment tools.[6] He et al, however, limit their outcomes to seven measures: the Montreal Cognitive Assessment (MoCA), Mini-Mental State Examination (MMSE), Digit Span Forward and Backward (DF/DB) Tasks, Trail Making Test A and B, and activities of daily living (ADL), without justifying for their selection and providing a rationale for excluding other tools.

Among these, DF/DB Tasks assess working memory capacity,[7] while the Trail Making Test is widely used for evaluating executive functions.[8] Nevertheless, He et al's SR/MA appears to omit measures for other cognitive domains, such as language, attention, and visuospatial-constructional abilities. Evidence suggests that early changes in language function may signal MCI onset, with deficits in language knowledge or language performance predicting progression to dementia.[9] Likewise, both amnestic and non-amnestic MCI patients exhibit consistent attentional deficits. Declines in simple sustained attention in both MCI subtypes, and in divided attention among amnestic MCI patients, may indicate early risk of dementia.[10]

Future SR/MAs should, therefore, consider including additional outcome measures: the Boston Naming Test and Semantic Verbal Fluency Tests for language, the Stroop Color-Word Test and Performance Test of Attention-Second Edition for attention, and the Rey-Osterrieth Complex Figure Task and Clock Drawing Test for visuospatial-constructional abilities.

Notably, while ADL evaluation is clinically relevant for MCI, its inclusion contradicts the stated original objective of assessing cognitive function per se.

Appropriateness of Risk of Bias Tools Warrants Re-Consideration

In the *Results* section, He et al report using the Cochrane bias risk assessment tool to evaluate the 20 included RCTs; however, the findings of this assessment are not provided.[3]

The authors also indicate the use of the Physiotherapy Evidence Database (PEDro) scale for bias evaluation, yet its appropriateness is questionable, as the PEDro scale was specifically designed to quantify the risk of bias (RoB) of RCTs involving physical therapy interventions.[11] For instance, Item 6 requires "blinding of all therapists who administered the

therapy".[12] However, in studies where MCI patients engage in leisure activities such as Mahjong or card playing, no therapists are involved. Therefore, for SR/MA focusing on leisure activity interventions, a combination of the Tool for the assEssment of Study qualiTy and reporting in EXercise (TESTEX)[13] and the Revised Cochrane Risk of Bias Tool for Randomized Trials (RoB 2.0)[14] may provide a more suitable assessment of trial quality and bias.

Lack of Certainty Grading: Constraints on Clinical Translation

He et al do not evaluate the certainty of evidence. Applying the Grades of Recommendation, Assessment, Development, and Evaluation (GRADE) framework[15] would have enabled a more rigorous appraisal of the pooled evidence, allowing clinicians to better balance benefits and risks when recommending individualized leisure activities for patients with MCI.

GRADE assessment clarifies whether conclusions are supported by high-certainty evidence or represent preliminary findings requiring further validation.[15] This distinction is essential for determining whether results can inform clinical practice or should remain hypotheses pending confirmation. For instance, in the MoCA and MMSE outcomes reported by He et al, if high RoB or wide confidence intervals downgrade the certainty to "Low", the pooled results—despite statistical significance—should be interpreted with caution in clinical scenarios.

Imprecisions in Language and Logic

Several statements in He et al's paper[3] lack precision.

First, while the *Limitations* section claims the exclusion of non-English research, RCTs published in Chinese are included.

Second, in Table 1, two studies are listed without reporting participants' ages, while another presents intervention and control group ages as 39.01 ± 10.85 and 41.29 ± 11.55 years old, respectively; nevertheless, the authors describe all participants simply as "elderly people with cognitive impairment".

Third, in the *Conclusions* section, they state that leisure activities "can enhance cognitive function, memory, executive function, ……". However, memory and executive function are subdomains of cognitive function, not independent constructs.[6]

Finally, the authors conclude that leisure activity is "a viable cognitive intervention…… with effects on par with or even better than those of TCRT" and that substantial evidence supports "leisure activity as a supplement or alternative to evidence-based cognitive rehabilitation". Such claims are untenable. As noted in our first point, the high heterogeneity of the intervention and control groups—each incorporating multiple concomitant treatments—precludes drawing this conclusion. To substantiate this, evidence would be required showing that leisure activities alone, or in combination with TCRT, yield greater cognitive benefits in patients with MCI than TCRT alone.

Conclusion and Recommendations

In summary, while He et al's SR/MA offers preliminary support for leisure activities engagement' cognitive benefits in MCI patients, significant methodological limitations undermine the validity and clinical utility of their findings. Future research should adopt more rigorous designs, including (1) stricter inclusion criteria to synthesize high-quality evidence, ideally through network meta-analysis to compare the relative efficacy of diverse leisure modalities, and (2) balanced evaluation of both the benefits and risks of leisure activities, whether employed as stand-alone interventions or as adjuncts to standard cognitive rehabilitation. These methodological refinements would yield more robust evidence to guide clinical decision-making in cognitive rehabilitation.

Abbreviations

ADL, Activities of Daily Living; DF Task, Digit Span Forward Task; DB Task, Digit Span Backward Task; GRADE, Grades of Recommendation, Assessment, Development, and Evaluation; MCI, Mild Cognitive Impairment; MMSE, Mini-Mental State Examination; MoCA, Montreal Cognitive Assessment; PEDro, Physiotherapy Evidence Database; PICOS, Population, Intervention, Comparator, Outcome and Study; QoL, Quality of Life; RCT(s), Randomized Controlled Trial(s); RoB, Risk of Bias; RoB 2.0, Revised Cochrane Risk of Bias Tool for Randomized Trials; rTMS, Repetitive Transcranial Magnetic Stimulation; SR/MA, Systematic Review and Meta-Analysis; TCRT, Traditional

Cognitive Rehabilitation Training; TESTEX, Tool for the assEssment of Study qualiTy and reporting in EXercise; VR, Virtual Reality.

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References

1. Kelley BJ. Treatment of mild cognitive impairment. *Curr Treat Options Neurol*. 2015;17(9):40. doi:10.1007/s11940-015-0372-3
2. Kasper S, Bancher C, Eckert A, et al. Management of mild cognitive impairment (MCI): the need for national and international guidelines. *World J Biol Psychiatry*. 2020;21(8):579–594. doi:10.1080/15622975.2019.1696473
3. He X, Liu C, Li Z, Cai X. Leisure activity interventions on cognition in mild cognitive impairment patients: a meta-analysis. *Neuropsychiatr Dis Treat*. 2025;21:1671–1687. doi:10.2147/NDT.S536627
4. Orsini N, Larsson SC, Salanti G. Dose-response meta-analysis. *Systematic Rev Health Res*. 2022;258–269. doi:10.1002/9781119099369.ch14
5. Zhao FY, Li L, Xu P, et al. Inadequate evidence for acupuncture as an alternative or adjunct to antidepressants/psychotherapy for postpartum depression: a bayesian systematic review and network meta-analysis. *Neuropsychiatr Dis Treat*. 2024;20:1741–1755. doi:10.2147/NDT.S484387
6. Kiely KM. *Cognitive Function[M]//Encyclopedia of Quality of Life and Well-Being Research*. Dordrecht: Springer; 2014:974–978.
7. Hester RL, Kinsella GJ, Ong BEN. Effect of age on forward and backward span tasks. *J Int Neuropsychol Soc*. 2004;10(4):475–481. doi:10.1017/S1355617704104037
8. Linari I, Juantorena GE, Ibáñez A, Petroni A, Kamienkowski JE. Unveiling trail making test: visual and manual trajectories indexing multiple executive processes. *Sci Rep*. 2022;12(1):14265. doi:10.1038/s41598-022-16431-9
9. McCullough KC, Bayles KA, Bouldin ED. Language performance of individuals at risk for mild cognitive impairment. *J Speech Lang Hear Res*. 2019;62(3):706–722. doi:10.1044/2018_JSLHR-L-18-0232
10. Saunders NL, Summers MJ. Longitudinal deficits to attention, executive, and working memory in subtypes of mild cognitive impairment. *Neuropsychology*. 2011;25(2):237–248. doi:10.1037/a0021134
11. Maher CG, Sherrington C, Herbert RD, Moseley AM, Elkins M. Reliability of the PEDro scale for rating quality of randomized controlled trials. *Physical Ther*. 2003;83(8):713–721. doi:10.1093/ptj/83.8.713
12. Albanese E, Bütikofer L, Armijo-Olivo S, Ha C, Egger M. Construct validity of the physiotherapy evidence database (PEDro) quality scale for randomized trials: item response theory and factor analyses. *Res Synth Methods*. 2020;11(2):227–236. doi:10.1002/jrsm.1385
13. Smart NA, Waldron M, Ismail H, et al. Validation of a new tool for the assessment of study quality and reporting in exercise training studies: TESTEX. *Int J Evid Based Healthc*. 2015;13(1):9–18. doi:10.1097/XEB.0000000000000020
14. Sterne JAC, Savović J, Page MJ, et al. RoB 2: a revised tool for assessing risk of bias in randomised trials. *BMJ*. 2019;366. doi:10.1136/bmj.l4898
15. Phillips M. Healthcare recommendations: grades of recommendation, assessment, development, and evaluation (GRADE) approach. *Evidence-Based Orthopedics*. 2021;19–23. doi:10.1002/9781119413936.ch4