Reviewer’s report

**Title:** Effects of Multicomponent Exercise on Cognitive Function in Older Adults with Amnestic Mild Cognitive Impairment: A Randomized Controlled Trial

**Version:** 2  **Date:** 23 July 2012

**Reviewer:** Laura D Baker

**Reviewer’s report:**

Although the authors describe an important area of research, there are a number of significant issues that need to be addressed in order to maintain a high standard of scientific rigor in this field.

Major Compulsory Revisions

1. **Abstract:** “There were significant interaction effects for the letter verbal fluency test between the groups” needs to be described more clearly. What type of an interaction?

2. **Background:** “This is particularly the case with amnestic MCI (aMCI), which is likely to progress to AD.” MCI is now considered early stage AD (see The diagnosis of dementia due to Alzheimer’s disease: recommendations from the National Institute on Aging-Alzheimer’s Association workgroups on diagnostic guidelines for Alzheimer’s disease. McKhann GM, Knopman DS, Chertkow H, Hyman BT, Jack CR Jr, Kawas CH, Klunk WE, Koroshetz WJ, Manly JJ, Mayeux R, Mohs RC, Morris JC, Rossor MN, Scheltens P, Carrillo MC, Thies B, Weintraub S, Phelps CH. Alzheimers Dement. 2011 May;7(3):263-9. Epub 2011 Apr 21). The authors should indicate that aMCI is likely to progress to Alzheimer’s dementia (not disease). Similar clarifications are needed throughout the paper.

3. **Background:** “According to these findings, randomized controlled trials examining the effects of exercise have proposed it is associated with various cognitive benefits, [15-25]” The studies cited (#15-25) are not all randomized controlled trials.

4. **Background:** This section does not adequately set the stage for multicomponent exercise that includes strength training, balance and dual-task cognitive training. One sentence (“because previous reviews suggested that combined…”) fails to provide adequate support for the selected intervention.

5. **Methods:** “The objective memory impairment was defined as having a lower memory in the Logical Memory II subtest of the Wechsler memory scale-revised (WMS-LM II).” What is meant by “lower memory”? Although a reference is provided, the authors need to provide a clear definition.

6. **Methods:** “The exercise class consisted of 16–17 participants, and each supervised session began with a 10 min warm-up period and stretching exercises, followed by 20 min of muscle strength exercise. After 60 min, the
subjects engaged in aerobic exercises, postural balance retraining, and dual-task training.” The durations listed are confusing. If every session began with a 10 min warm-up, followed by 20 minutes of muscle strength training, what happened in minutes 30 to 60? The authors indicate that aerobic, balance, and dual-task exercises did not occur until minute 60.

7. Methods: “One of the four classes during the intervention period included approximately 20#30 minutes of consecutive outdoor walking.” This sentence is unclear. One of four? Do the authors mean one out of every four classes? Also, what is ‘consecutive outdoor walking’?

8. Methods: “For example, the subjects in the exercise group were asked to invent their own poem while walking…” How did the authors assess success of performing the dual task? Were poems recorded and evaluated for complexity of ideas?

9. Methods: “In the ladder training, subjects memorized a step pattern in consecutive square segments, and were instructed to step as quickly and accurately as possible.” This is the first reference to ‘ladder training’; the description of the task is not clear. Are the squares marked on the ground? Why is the word ‘ladder’ used in the description?

10. Methods: “The physiotherapists and well-trained instructors implemented risk management for adverse accidents.” This sentence is not clear; what is meant by ‘implemented risk management’? Do the authors mean to say that physiotherapists provided ongoing safety monitoring?

11. Methods: “The subjects were required to carry out daily home-based muscle strength exercises and walking, which were self-monitored using a booklet and pedometer based on the concept of promoting exercise and changing behavior.” This sentence is not clear. ‘Monitoring using a booklet’ is not possible. Also, how many times per week were subjects asked to complete home-based exercises… in addition to the 2 sessions per week? Or… was it that all subjects were requested to exercise twice per week, and some (68%) attended the structured program? This point, if true, is not clear in the Methods of the paper.

12. Methods: “These analyses were performed among all subjects together and in the sub-groups of males versus females and young versus old subjects (under 74 years versus 75 years and over).” No rationale is provided for subanalyses by sex and by age. Any findings related to sex or age will appear spurious without proper justification.

13. Results: F-values and degrees of freedom need to be provided for all ANOVAs. As is, it is difficult to determine whether the reported finding is the result of a t-test or an F-test.

14. Results, Changes in cognitive function: the authors first list results of pairwise comparisons comparing baseline to month 12, although in the Methods, the authors indicate that group x time ANOVAs are the first to be conducted, and that pairwise tests would only be performed when the F-value was significant. The only finding reaching significance using this strategy is that for LVFT. All other ANOVA findings failed to reach significance and therefore should not be reported (or at least reported last rather than first).
15. Discussion: “Early in the dementia process, the ability to consciously access lexical information about a target word is impaired [39], but as the disease progresses, it is likely that degradation of the semantic system occurs, resulting in impaired name recall in structured tasks and spontaneous conversation. [39, 40]” This sentence is confusing. Do the authors mean to say that early in the disease, access is impaired while the overall semantic system is intact, whereas later in the disease, the integrity of the entire system is compromised?

Minor Essential Revisions

1. Abstract: “within the first 6 months” needs to be defined more precisely (e.g., in month 6, between months 4 and 6, etc.)

2. Background: “[18,20,21,24] However, because the results of these studies differed, sufficient evidence has not been garnered regarding the relationship between exercise and aMCI.” The results of these studies differed largely due to differences in methodology. This point should be made to help reader understand differences across studies.

3. Methods: “The mean intensity of the aerobic exercises was approximately 60% of maximum heart rate.” How was intensity assessed? Period radial measurements of heart rate? How frequently were these measurements assessed?

4. Discussion: “The present study shows that a significant interaction was observed in verbal fluency between the groups, although processing speed and inhibition did not reach significance.” The authors need to indicate ‘a significant group by time interaction was observed’ and ‘although intervention effects on processing speed and response inhibition did not reach significance’

5. Discussion: “The multicomponent exercise training used in the current study also included aerobic exercise and behavioral interventions, such as encouragement of home exercise and outdoor walking.” This sentence is unclear. The behavioral intervention = encouragement of home exercise and outdoor walking?

Discretionary Revisions

1. Methods: “subjects underwent circuit training” Consider the following edit to this text: “subjects completed circuit training”

2. Methods: “the subjects in the exercise group were asked to invent their own poem while walking, as the aerobic exercise” Consider dropping the last clause (“as the aerobic exercise”) it will likely be confusing to the reader

Level of interest: An article of limited interest

Quality of written English: Needs some language corrections before being published

Statistical review: Yes, and I have assessed the statistics in my report.
Declaration of competing interests:

I have no conflicts of interest