

# Brain vitality enhancement for people with mild cognitive impairment in Hong Kong: abridged secondary publication

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## KEY MESSAGES

1. A peer-supported exercise programme was developed to promote brain health among people with mild cognitive impairment.
2. The programme effectively sustained improvements in executive function, attention, and working memory among people with mild cognitive impairment.
3. The programme is highly feasible and acceptable for peer mentors and people with suboptimal cognitive function.
4. The high numbers of app downloads and content views indicate a strong need for education

regarding mild cognitive impairment and strategies to prevent cognitive decline.

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## Introduction

People with mild cognitive impairment (MCI) are at risk of progression to dementia. Maintaining physical activity is a key strategy for preventing cognitive decline. Peer mentors are effective in enhancing older adults' engagement in physical activity. We developed a peer-support exercise programme—Brain Vitality Enhancement (BRAVE)—to promote brain health among adults with MCI. We examined the effects of the programme on cognitive function and physical and mental well-being among community-dwelling adults with MCI, along with participant satisfaction and programme acceptability.

## Methods

The BRAVE programme consisted of two phases: (1) an empowerment workshop for peer mentors and (2) a supervised exercise programme for adults with suboptimal cognitive function.

Peer mentors who were both cognitively normal and physically active were recruited to attend an empowerment workshop that provides education about MCI, communication strategies for interacting with people with MCI, barriers to exercise and their solutions, and exercise safety. A mobile app was introduced to the peer mentors; the app was designed to promote self-directed learning, activity scheduling and tracking, and social networking between and/or within mentor-mentee groups. The peer mentors were trained in a structured exercise training module (three sessions/week for 3 weeks) about techniques for assisting with

exercise setup, exercise demonstration, monitoring participants' execution, and motivating participants during the exercise. The workshop concluded with a booster session to consolidate the exercise and mentoring skills of peer mentors; their competency was evaluated via return demonstration.

People aged  $\geq 50$  years with MCI, who scored 19 to 26 on the Montreal Cognitive Assessment, were randomly assigned to receive either the BRAVE programme or usual care. Usual care comprised social and leisure activities that did not involve any structured exercise or cognitive training activities. Participants in the usual care group were later invited to join the BRAVE programme after completing the data collection. Participants in the BRAVE programme (8 to 10 per group) received three 60-minute exercise sessions per week for 8 weeks, delivered by a coach with the support of two to three peer mentors per group. The exercises simulated daily functional tasks. After the exercise module, a counselling session was conducted to help integrate the mentor-directed exercise training into the participants' lifestyles. The coach offered continuous support to the mentor-mentee groups through the app and visits during mentor-directed exercise sessions.

Outcome measures included the Alzheimer's Disease Assessment Scale–Cognitive subscale for global cognition, the digit span forward and backward tests for short-term and working memory, the Color Trails Tests 1 and 2 for executive function, and the Short Form 36 for health-related quality of life (HRQoL). Focus group interviews were

conducted to evaluate participant satisfaction and programme acceptability.

## Results

Of 50 peer mentors recruited, 46 (mean age, 66.6 years) completed the training. They had good HRQoL at baseline. Their Short Form 36 physical and mental component scores did not significantly change before and after the training.

Of 250 people with MCI, 229 (mean age, 74.4 years) were included in the analysis; 85.6% of them were women. The overall adherence rate for the BRAVE programme was 81.0%; 92% of participants attended at least 75% of the sessions. Compared with the control group, the BRAVE group showed greater improvements in working memory, processing speed and attention immediately post-intervention and at 3 months, as well as sequencing and mental flexibility at 3 months (Fig). There were no significant between-group differences in short-term memory, global cognition, or HRQoL across all time points.

The peer mentors commented that the programme was comprehensive, equipping them with the knowledge and ability needed to mentor exercise for people with MCI. They reported that the programme was meaningful, enabling them to contribute to society while benefitting themselves by maintaining physically and cognitively active. They perceived the training programme as highly practical with the use of simple exercise equipment. Some peer mentors considered the pre-exercise educational module crucial because they did not have prior experience dealing with individuals with MCI. They highlighted the practical tips regarding motivating older adults and the role-play sessions for practising appropriate communication with and responses to people with MCI. They commented that the BRAVE app was a helpful resource for obtaining necessary information about MCI and exercise. They provided positive feedback about the exercise videos, which were helpful for their own practice and for motivating people with MCI. Some peer mentors suggested arranging group exercises according to participants' abilities such that those with similar abilities would be scheduled in the same session. Additionally, peer mentors preferred greater autonomy in leading the exercise sessions.

People with MCI were highly satisfied with the programme, with a mean satisfaction score of 46.16 out of 50. The item with the highest satisfaction was related to the overall programme design, whereas the item with the lowest satisfaction was the programme length (Table). They commented that the programme was comprehensive and resourceful, thereby raising their awareness of MCI and dementia and strategies for maintaining cognitive function. They described the exercise protocol as highly feasible and enjoyable. They valued the in-person

and group format of the exercise sessions, which allowed interactions between other groupmates, peer mentors, and the coach. The BRAVE programme enabled social connections in the community, thereby motivating engagement in long-term exercise habits. Participants can practise the exercises at home, particularly during the COVID-19 pandemic. Some participants perceived the exercises as challenging and difficult to memorise and follow certain movements.

## Discussion

The BRAVE programme effectively improved working memory, processing speed, and executive function in people with MCI. However, there were no significant improvements in global cognition, short-term memory, or HRQoL.

The most promising cognitive benefit of the BRAVE programme was improvement in executive function. Impairment in executive function is a strong predictor of progression from MCI to dementia. Executive function encompasses inhibition, working memory, and mental flexibility, which are essential higher-order neurocognitive skills to maintain independence in daily living. Meta-analyses found that exercise interventions have significant but small effect size in improving executive function among people with MCI.<sup>1,2</sup> The effect was superior in our study, because our programme included well-trained peer mentors to support its delivery. Peer-assisted or peer-led exercise interventions are effective in enhancing physical activity adherence among healthy older adults.<sup>3</sup> Two pilot studies examining peer-assisted exercise interventions among individuals with subjective memory complaints<sup>4</sup> and/or MCI<sup>5</sup> reported significantly greater therapeutic effects on executive function, memory and attention,<sup>4</sup> and physical activity levels in exercise groups compared with health education groups.<sup>5</sup> The involvement of peer mentors increased the levels of interactive communication and social interaction, thereby providing social connections and engagement for participants. This may have led to enhanced motivation and larger, more sustainable effects on cognition. The exercise protocol comprised mainly aerobic and resistance training with increasing intensity, as recommended by international guidelines for cognitive improvement in older adults. The exercises were designed to facilitate self-practice without requiring special exercise equipment. This enabled participants to continue exercising after the training period.

We did not detect significant between-group differences in global cognition and short-term memory. These findings are inconsistent with those of other exercise intervention studies. The discrepancy may be related to the use of different tools for global cognition measurement. The

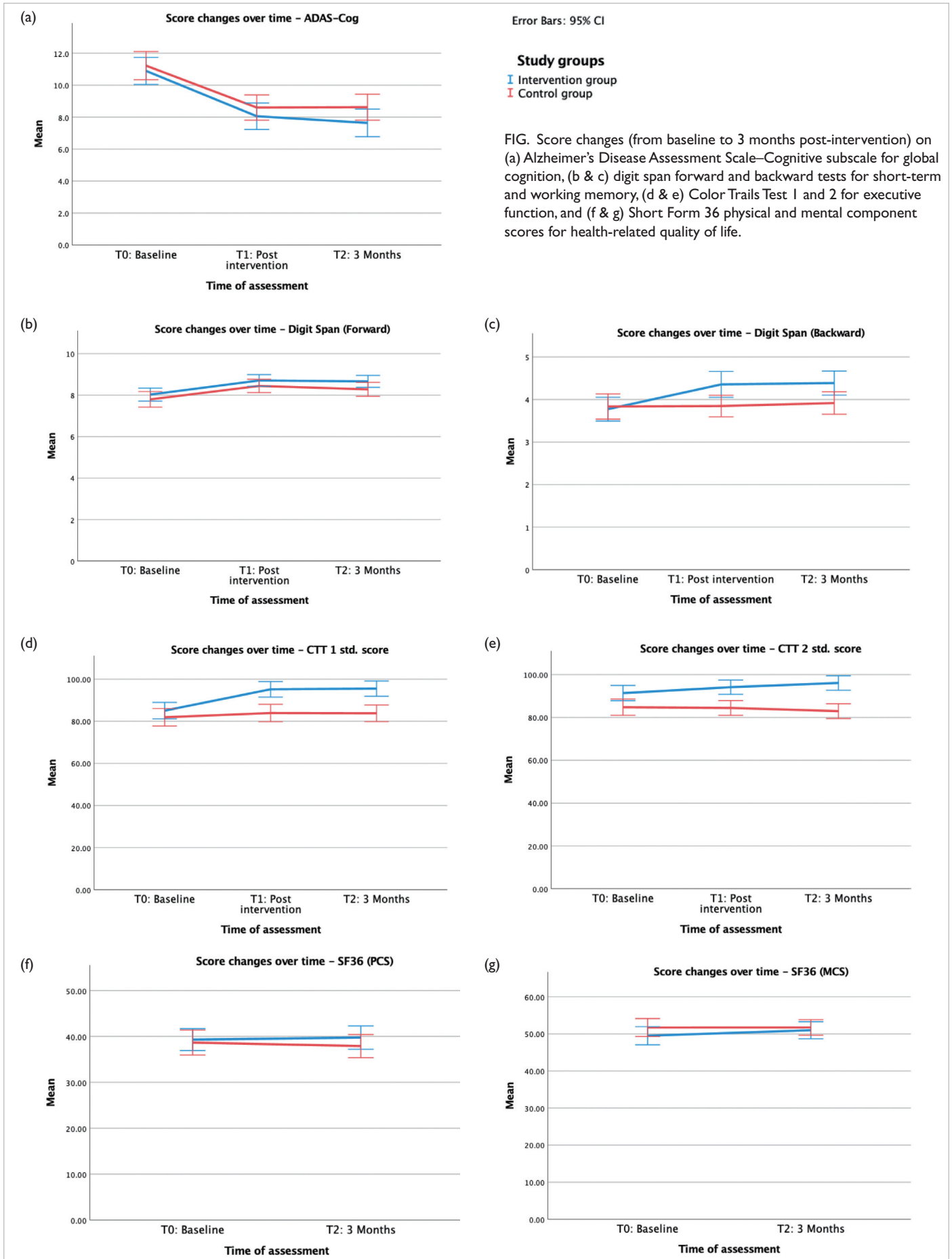


TABLE. Participant satisfaction with the Brain Vitality Enhancement programme

Item	Score*
1. I understand the purpose of this programme.	4.55±0.60
2. I understand the content of this programme.	4.57±0.58
3. After completion of this programme, I can better understand how this topic relates to me.	4.59±0.57
4. The content in the programme provides me with tangible information which can be integrated into my daily life.	4.60±0.56
5. After completion of this programme, I will implement the suggestions and incorporate them into my daily life.	4.54±0.73
6. The interactive methods in this programme encouraged my participation.	4.66±0.56
7. Instructors/speakers are happy to answer my queries.	4.72±0.53
8. The programme length is commensurate with the content.	4.46±0.63
9. Overall, I am very satisfied with the programme.	4.77±0.54
10. I am willing to recommend this programme to my friends.	4.66±0.56
Overall	46.16±4.49

\* Data are presented as mean±standard deviation

Alzheimer's Disease Assessment Scale–Cognitive subscale was developed to assess drug treatment efficacy in people with Alzheimer's disease; its application in the non-dementia population may be affected by its suboptimal sensitivity.

We successfully trained cognitively normal adults to support the delivery of the BRAVE programme. The peer mentors were fully equipped with the knowledge and skills needed to mentor exercise sessions for people with MCI. They can be further trained to promote active ageing. The peer mentors were of similar age to the people with MCI; this facilitated social connections and acceptance between them. Additionally, the use of scenario-based and role-playing teaching techniques enabled the peer mentors to actively acquire mentoring and communication skills.

Considering the high numbers of app downloads and content views, the BRAVE app may serve as a standalone scalable intervention for promoting brain health among older adults, with the support of family members and trained peer mentors. This is particularly relevant in the post-COVID-19 era, in which there is increasing acceptance of communication technology to provide health information and interventions.

The BRAVE programme is highly feasible and acceptable for people with MCI. Although an active lifestyle has beneficial effects on brain health promotion, the existing health and social care system lacks a structured and comprehensive method for empowering people with MCI to integrate an active lifestyle into their daily routines for long-term benefits. Peer mentors are social capital. The BRAVE programme is an effective social care service that supports self-fulfilling experience and promotes active ageing in Hong Kong.

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## Disclosure

The results of this research have been previously published in:

1. Li PWC, Yu DSE, Siu PM, Wong SCK, Chan BS. Peer-supported exercise intervention for persons with mild cognitive impairment: a waitlist randomised controlled trial (the BRAIn Vitality Enhancement trial). *Age Ageing* 2022;51:afac213.
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