

Supplementary Material

Article Title: Effects of a Digital Multi-domain Cognitive Intervention in Older People at High Risk of Dementia: A Randomized Clinical Trial

Authors: Yuanjiao Yan, PhD; Xinying Lin, MM; Ying Lu; Zixin Fang, MM; Xiaozhen Fu, MM; Shaobo Wu, MM; Bingjie Wei, MM; Zhengmin Wang, MM; Yunzhen Chen, MM; Zhi Chen, MM; Rong Lin, PhD; Hong Li, PhD

**DOI
Number:** 10.4088/JCP.25m15860

LIST OF SUPPLEMENTARY MATERIAL FOR THE ARTICLE

1. [Appendix 1](#) The CONSORT 2010 Checklist
2. [Appendix 2](#) Detailed Scoring Algorithm and Weighting Scheme of the Modified Dementia Risk Score (MDRS)
3. [Appendix 3](#) Details of the Digital Multi-Domain Cognitive Intervention Course Schedule and Cognitive Point-Based Incentive Rules
4. [Appendix 4](#) Detailed Description of the Integrated Cognitive Intervention Platform and Management System
5. [Appendix 5](#) Subgroup Analysis of Intervention Efficacy Based on Demographic and Clinical Characteristics
6. [Appendix 6](#) Subgroup Analysis of Intervention Effects Based on Adherence Levels

DISCLAIMER

This Supplementary Material has been provided by the authors as an enhancement to the published article. It has been approved by peer review; however, it has undergone neither editing nor formatting by in-house editorial staff. The material is presented in the manner supplied by the author.



Appendix 1. CONSORT 2010 checklist of information to include when reporting a randomised trial*

Section/Topic	Item No	Checklist item	Reported on page No
Title and abstract			
	1a	Identification as a randomised trial in the title	1
	1b	Structured summary of trial design, methods, results, and conclusions (for specific guidance see CONSORT for abstracts)	1-2
Introduction			
Background and objectives	2a	Scientific background and explanation of rationale	3-5
	2b	Specific objectives or hypotheses	3-5
Methods			
Trial design	3a	Description of trial design (such as parallel, factorial) including allocation ratio	5-13
	3b	Important changes to methods after trial commencement (such as eligibility criteria), with reasons	N/A
Participants	4a	Eligibility criteria for participants	6
	4b	Settings and locations where the data were collected	5-6
Interventions	5	The interventions for each group with sufficient details to allow replication, including how and when they were actually administered	8-9
Outcomes	6a	Completely defined pre-specified primary and secondary outcome measures, including how and when they were assessed	11-12
	6b	Any changes to trial outcomes after the trial commenced, with reasons	11-12
Sample size	7a	How sample size was determined	7
	7b	When applicable, explanation of any interim analyses and stopping guidelines	7
Randomisation:			
Sequence generation	8a	Method used to generate the random allocation sequence	7-8
	8b	Type of randomisation; details of any restriction (such as blocking and block size)	7-8
Allocation concealment mechanism	9	Mechanism used to implement the random allocation sequence (such as sequentially numbered containers), describing any steps taken to conceal the sequence until interventions were assigned	7-8
Implementation	10	Who generated the random allocation sequence, who enrolled participants, and who assigned participants to interventions	8-11
Blinding	11a	If done, who was blinded after assignment to interventions (for example, participants, care providers, those	7-8

	assessing outcomes) and how	
Statistical methods	11b If relevant, description of the similarity of interventions	7-11
	12a Statistical methods used to compare groups for primary and secondary outcomes	12-13
	12b Methods for additional analyses, such as subgroup analyses and adjusted analyses	12-13
Results		
Participant flow (a diagram is strongly recommended)	13a For each group, the numbers of participants who were randomly assigned, received intended treatment, and were analysed for the primary outcome	14
Recruitment	13b For each group, losses and exclusions after randomisation, together with reasons	14
	14a Dates defining the periods of recruitment and follow-up	14
	14b Why the trial ended or was stopped	14
Baseline data	15 A table showing baseline demographic and clinical characteristics for each group	14-15
Numbers analysed	16 For each group, number of participants (denominator) included in each analysis and whether the analysis was by original assigned groups	14-20
Outcomes and estimation	17a For each primary and secondary outcome, results for each group, and the estimated effect size and its precision (such as 95% confidence interval)	14-20
	17b For binary outcomes, presentation of both absolute and relative effect sizes is recommended	N/A
Ancillary analyses	18 Results of any other analyses performed, including subgroup analyses and adjusted analyses, distinguishing pre-specified from exploratory	14-20
Harms	19 All important harms or unintended effects in each group (for specific guidance see CONSORT for harms)	14-20
		Appendix 5-6
Discussion		
Limitations	20 Trial limitations, addressing sources of potential bias, imprecision, and, if relevant, multiplicity of analyses	29-30
Generalisability	21 Generalisability (external validity, applicability) of the trial findings	20-29
Interpretation	22 Interpretation consistent with results, balancing benefits and harms, and considering other relevant evidence	20-29
Other information		
Registration	23 Registration number and name of trial registry	1
Protocol	24 Where the full trial protocol can be accessed, if available	N/A
Funding	25 Sources of funding and other support (such as supply of drugs), role of funders	30-31

Citation: Schulz KF, Altman DG, Moher D, for the CONSORT Group. CONSORT 2010 Statement: updated guidelines for reporting parallel group randomised trials. *BMC Medicine*. 2010;8:18. © 2010 Schulz et al. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/2.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

*We strongly recommend reading this statement in conjunction with the CONSORT 2010 Explanation and Elaboration for important clarifications on all the items. If relevant, we also recommend reading CONSORT extensions for cluster randomised trials, non-inferiority and equivalence trials, non-pharmacological treatments, herbal interventions, and pragmatic trials. Additional extensions are forthcoming: for those and for up-to-date references relevant to this checklist, see www.consort-statement.org.

Appendix 2. Detailed Scoring Algorithm and Weighting Scheme of the Modified Dementia Risk Score (MDRS)

Detailed Scoring Algorithm and Weighting Scheme of the Modified Dementia Risk Score (MDRS)			
Model 1 AUC=0.812 Sensitivity=0.861 Specificity=0.643 High risk population score>79			Model 2 AUC=0.848 Sensitivity=0.794 Specificity=0.757 High risk population score>100
	Variables	score1	score 2
Age, years	40-48	0	0
	49-55	26	26
	56-60	55	55
	61-64	76	76
	>64	100	100
Education	High (college or university level or above)	0	0
	Intermediate (secondary specialized or high school)	4	4
	Low (junior high school and below)	6	6
Gender	Female	0	0
	Male	10	10
Physical activity	Active (at least once a week)	0	0
	Inactive (less than once a week)	3	4
Current smoking status	No	0	0
	Yes	6	6
Glycemic status	$\leq 11.1 \text{ mmol/L}$	0	0
	$> 11.1 \text{ mmol/L}$	17	16
Depressive symptoms	No	0	0
	Yes	12	12
APOE $\epsilon 4$ status	Non- $\epsilon 4$	\	0
	$\epsilon 4$	\	26

Appendix 3. Details of the Digital Multi-Domain Cognitive Intervention Course Schedule and Cognitive Point-Based Incentive Rules

<h2 style="text-align: center;">Details of the Digital Multi-Domain Cognitive Intervention Course Schedule and Cognitive Point-Based Incentive Rules</h2>				
Course Modules	Course Contents	Course Frequency	Cognitive Point-Based Incentive Rules	Please “✓” to complete
Module 1: Health Education Gain knowledge about brain health	Participants were required to study weekly health education materials, such as dementia-related articles and videos	1 time/ week	Completion of health education materials, including viewing articles/videos: +3 cognitive points per session; answering the accompanying questions correctly: +2 cognitive points per session	
Module 2: Health Monitoring (1) daily health lifestyle record (2) self-assessments of psychological well-being	(1) daily health lifestyle record: record the management of chronic conditions such as diabetes and hypertension, sedentary time, sleep patterns, and daily physical activity (excluding cognitive rehabilitation content delivered via the WeChat applet) (2) self-assessments of psychological well-being: completion of psychological well-being self-assessment test	(1) daily health lifestyle record: 1 time/ day (2) self-assessments of psychological well-being: 1 time/ month	(1) daily health lifestyle record: complete a daily health lifestyle record as required: +3 cognitive points/day (2) self-assessments of psychological well-being: complete one questionnaire: +5 cognitive points per submission (Note: All questions must be answered before submission)	
Module 3: Cognitive Training Cognitive domain training	Cognitive training games targeting domains such as memory, attention, executive function, and visuospatial abilities	3-5 times/ week, for at least 120 minutes per week	Complete the exercises following the video instructions on the WeChat applet (weekly training duration is automatically tracked; after each session, record any fatigue or discomfort in the comments section below the video): (1) Up to 30 minutes of training per week: +10 cognitive points (2) >30 minutes, less than 60 minutes: +15	

			cognitive points (3) >60 minutes, less than 90 minutes: +20 cognitive points (4) >90 minutes, less than 120 minutes: +25 cognitive points (5) >120 minutes: +30 cognitive points	
Module 4: Cognitive Stimulation Brainpower through Creativity	Complete one weekly art creation based on the WeChat applet theme, using any form or combination of visual, performing, or literary arts	1 time/ week	Complete the art-based cognitive assignment and upload it to Communication Interactive (+20 cognitive points/time). Choose to make the artwork public or private; either option does not affect point rewards.	
Module 5: Cognitive Rehabilitation Striving to be a Vibrant Elderly Person	Rehabilitation-based exercises: aerobic, resistance, balance, and traditional practices (Tai Chi, Baduanjin).	3-5 times/ week, for at least 120 minutes per week	Complete the exercises following the video instructions on the WeChat applet (weekly training duration is automatically tracked; after each session, record any fatigue or discomfort in the comments section below the video): (1) Up to 30 minutes of training per week: +10 cognitive points (2) >30 minutes, less than 60 minutes: +15 cognitive points (3) >60 minutes, less than 90 minutes: +20 cognitive points (4) >90 minutes, less than 120 minutes: +25 cognitive points (5) >120 minutes: +30 cognitive points	

<p>Module 6: Social interaction Interpersonal interaction and communication</p>	<p>Interactive engagement among participants was encouraged through expressing appreciation for others' artwork via likes and comments, as well as sharing their task participation and progress within the WeChat group.</p>	<p>/</p>	<p>Interacting with others' works: +1 cognitive point/time for liking, +2 cognitive points/time for commenting.</p>	
--	---	----------	---	--

Appendix 4. Technical Specifications of the Integrated Cognitive Intervention Platform and Management System

Detailed Description of the Integrated Cognitive Intervention Platform and Management System

Supplementary information

Intellectual Property Certification

To protect the intellectual property rights of the developed system, the Integrated Cognitive Intervention Platform (Chinese name: 整合认知干预平台; Registration No. 2024SR1274897) and the Integrated Cognitive Intervention Management System (Chinese name: 整合认知干预管理系统; Registration No. 2024SR1274898) applied in this study have been officially registered and certified by the China Copyright Protection Center (<https://register.ccopyright.com.cn/query.html>). This certification ensures both the legal compliance and the technical uniqueness of the programs.

I. Cognitive Training Module

All cognitive training modules were designed based on neurocognitive training strategies using a bottom-up approach[1], which emphasizes extensive and systematic practice with lower-level cognitive processes and gradually builds toward higher-level processes. Each module targeted a specific cognitive domain, including memory, executive function, visuospatial ability, and attention. Participants could select training tasks based on their baseline cognitive assessment results as well as their personal preferences, thereby ensuring individualized relevance and engagement. To monitor adherence, weekly training duration was automatically recorded, with a cumulative total of more than 120 minutes per week defined as excellent performance. Participants who reached this threshold were rewarded with 30 “cognitive points,”

which were displayed in the personal center under “My Cognitive Points” with a detailed incentive record. To prevent excessive use, training time beyond 120 minutes per week did not contribute to additional rewards, although participants were free to continue practicing. This reward–restriction mechanism was intended to optimize adherence while minimizing the risk of fatigue or overtraining.

Within each module, tasks were structured to begin at a simple level, allowing participants to engage in repeated practice and gradually progress to more complex challenges; as the complexity increased, improvements in higher-order cognitive processes were also facilitated. Specifically, memory training included Card Memory and Digital Memory tasks; executive function training incorporated Stroop color-word test and Maze navigation tasks; visuospatial training involved Tower-building and Tetris; and attention training was supported by mindfulness-based exercises. To ensure usability and accessibility for older adults, all modules were adapted with aging-friendly modifications, such as enlarged fonts, simplified interfaces, culturally familiar materials, task prompts, motivational feedback, and appropriate adjustments to task difficulty. The operational feasibility and cognitive load of all modules were validated in pilot feasibility study.

(1) Memory training

Memory training in this program includes Card Memory and Digit Memory tasks.

Card Memory

In the Card Memory task, participants are asked to memorize pairs of cards with identical symbols within a predetermined time window ranging from 5 to 60 seconds, depending on task difficulty (e.g., at the entry level, four cards with two matching pairs are presented for 5 seconds). After the memorization period, all cards are turned face down, and participants are required to recall and match the corresponding pairs. During gameplay, two cards are selected consecutively: if the symbols match, the pair remains uncovered; if they do not, both cards are re-covered. The task continues until

all pairs have been successfully matched, at which point the trial ends. This process systematically trains episodic and visual memory by progressively increasing the number of cards and the memorization duration across difficulty levels (Figure 1).

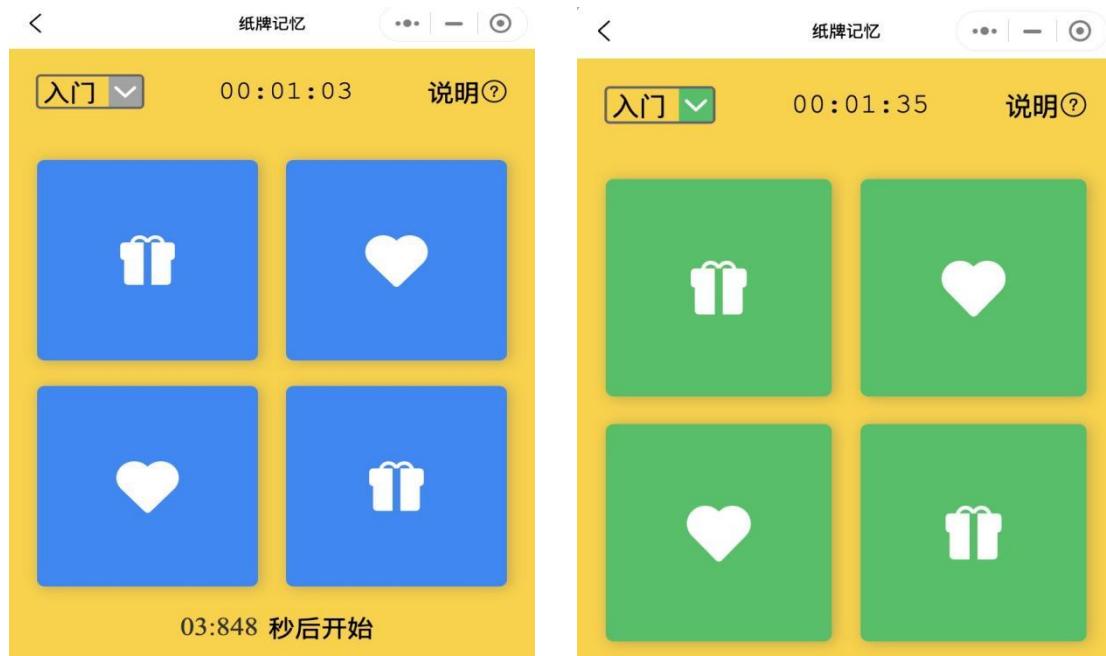


Figure 1. The entry level task of Card memory task

Digit Memory

In the Digit Memory task, participants are presented with a sequence of Arabic numerals for brief exposure. During the recall phase, they are required to select the cards in ascending numerical order. This task is designed to strengthen sequential processing, working memory, and short-term numerical memory. Task difficulty is adjusted by varying the length of the digit sequence and the exposure time, enabling progressive training of memory capacity and information retrieval efficiency (Figure 2).

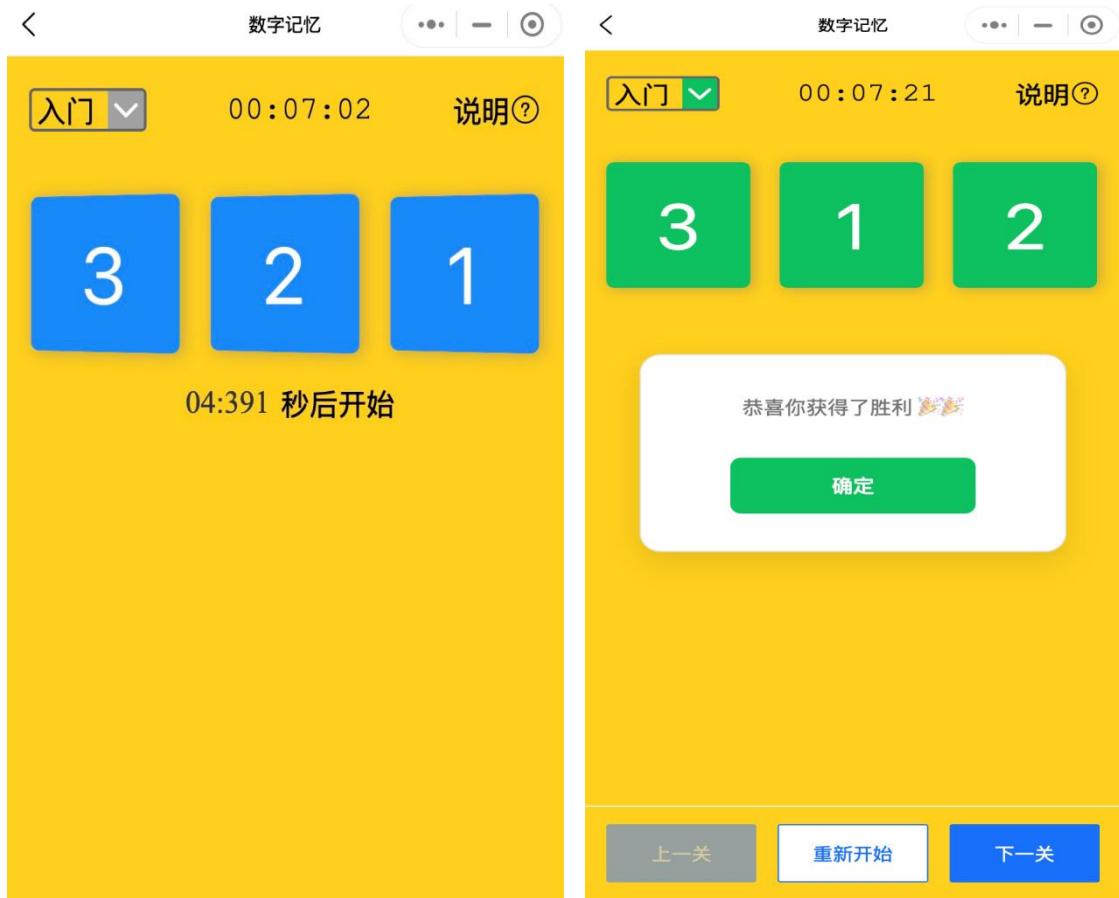


Figure 2. The entry level task of Digit memory task

Executive function training

A set of games focusing on dominant cognitive inhibition, spatial planning, and problem-solving abilities, includes Stroop color-word test and Maze navigation tasks,

Stroop color-word test

This module is adapted from the classic Stroop task and is designed to strengthen executive function by training response inhibition and conflict resolution. Participants are instructed to ignore the semantic meaning of a word and instead identify its font color (e.g., the word “blue” presented in red font should be reported as red). In each trial, a color-related word is displayed (e.g., “Select the color of the word below”), followed by two response options that may be either congruent or incongruent with the stimulus. For example, the word “green” may be shown in blue font, with options such as “green” written in blue and “blue” written in green. Participants are required

to select the option whose word meaning corresponds to the font color of the target word within 60 seconds. Each correct response is awarded 1 point, and consecutive correct answers trigger adaptive difficulty adjustments, such as shortened stimulus presentation time or the addition of distractors (Figure 3).



Figure 3. The details of Stroop color-word test

Maze navigation tasks

This module is designed to strengthen executive function by engaging spatial planning, problem-solving, and cognitive flexibility. Participants are instructed to guide a colored block (initially yellow) from the starting point to the designated exit in the bottom-right corner of the maze. Movement is controlled through on-screen arrow buttons: tapping \uparrow , \downarrow , \leftarrow , or \rightarrow shifts the block one step in the corresponding direction, and a “Back” control allows reversal of the previous move. The task begins with simple layouts and progressively increases in complexity. After a

period of practice, participants may select higher difficulty levels, where the maze structures involve longer paths, more dead ends, and greater demands on planning ability. The system provides immediate feedback on both errors and successful moves. Performance is evaluated by completion time and number of errors, with the ultimate goal of reaching the exit as quickly and accurately as possible (Figure 4).

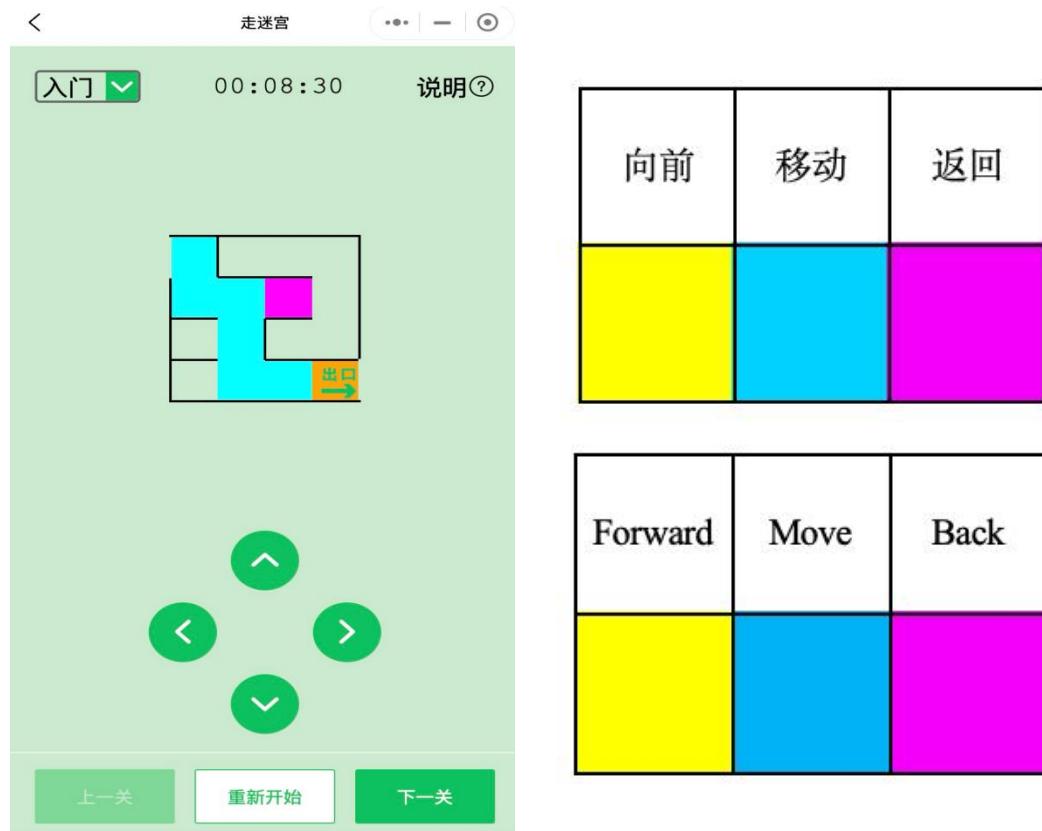


Figure 4. The details of Maze navigation tasks

Visuospatial training

This module focuses on strengthening visuospatial abilities, including spatial relationship judgment, shape manipulation, and three-dimensional structure construction. Two representative tasks are employed: Tower-Building and Tetris tasks.

Tower-building

This visuospatial training module is designed to enhance spatial perception, coordination, and fine motor control. Participants are required to stack moving blocks

on top of each other to build a tower as high as possible. When a moving block overlaps with the one below, the participant taps anywhere on the screen to place it. Only the overlapping portion remains as the new platform, while any non-overlapping part is removed. If a block is placed without any overlap, the game ends. The task begins with slower block movement, allowing easier alignment, and progressively increases in difficulty by accelerating block speed and reducing tolerance for misalignment. This incremental challenge trains visual-motor integration, accuracy of spatial judgment, and sustained attention (Figure 5).



Figure 5. The details of Tower-building tasks

Tetris

This task is adapted from the classic Tetris paradigm and is designed to train visuospatial transformation, mental rotation, and rapid spatial decision-making. Participants are required to manipulate falling geometric blocks in real time, using directional controls to move, rotate, or accelerate the pieces so that they align precisely within a fixed grid. When a full horizontal row is completed, it is cleared

from the screen, allowing continued play. The task begins with slower falling speeds and fewer block variations, gradually increasing in difficulty as speed accelerates and shape complexity grows. The game ends when stacked blocks reach the top of the screen. Performance is evaluated based on the number of rows cleared, accuracy of spatial alignment, and reaction speed, reflecting participants' capacity for dynamic spatial processing and visual-motor coordination. (Figure 6)

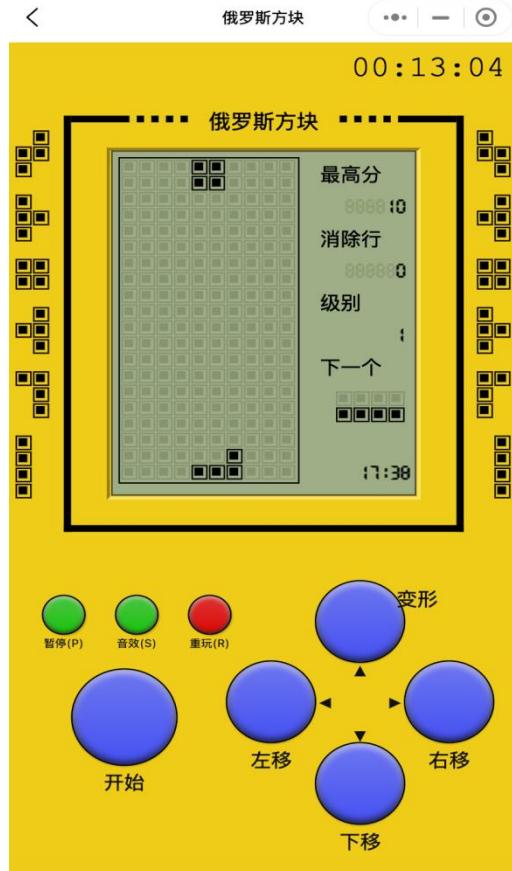


Figure 6. The details of Tetris tasks

Attention Training

This module is designed to strengthen attentional control by targeting sustained focus, resistance to interference, and flexible regulation of attentional scope. The training consists of three core components: Body Scanning, Mindfulness Training, and Relaxation Training.

Body Scanning

Participants are guided to shift their attention sequentially across different body regions, such as from the toes to the head, focusing on physical sensations in each area.

Mindfulness Training

Participants practice maintaining awareness of present experiences, such as breathing or bodily sensations, and gently redirect their focus whenever distraction occurs. Training themes include but are not limited to mindful stress reduction, discovering joy, self-acceptance, and cultivating kindness.

Relaxation Training

Participants engage in guided sessions involving deep breathing, imagery, or progressive muscle relaxation to release tension and establish a calm state that supports attentional engagement.

Each task is delivered through audio-guided sessions with diverse themes, allowing participants to choose according to their preferences (Figure 7).

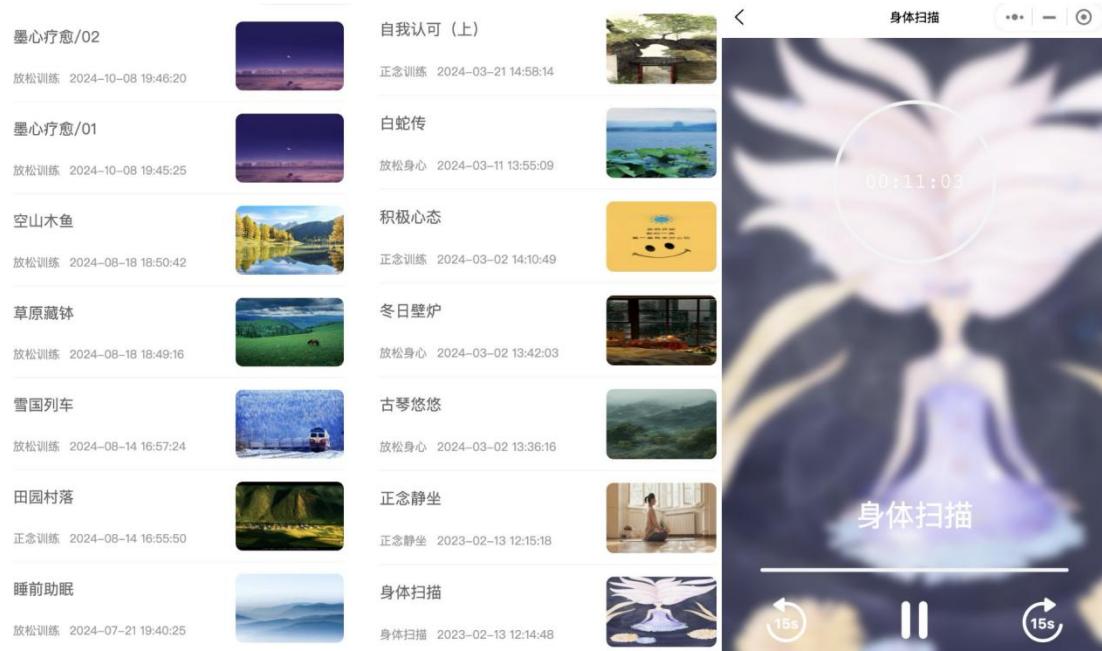


Figure 7. The details of Attention Training tasks

References:

[1] Nuechterlein KH, Ventura J, Subotnik KL, Hayata JN, Medalia A, Bell MD. Developing a Cognitive Training Strategy for First-Episode Schizophrenia: Integrating Bottom-Up and Top-Down Approaches. *Am J Psychiatr Rehabil.* 2014;17(3):225-253. doi:10.1080/15487768.2014.935674

II. Cognitive Rehabilitation Module

This module adopts structured physical exercise as the core intervention, building on the research evidence from our previous clinical trials [1–3]. It emphasizes the synergistic benefits of multidimensional physical activity and cognitive enhancement. The program consists of several components, including:

- (1) Warm-up and Stretching: Gentle movements to prepare the body and reduce injury risk.
- (2) Resistance Training: Exercises targeting major muscle groups (e.g., upper limbs, shoulders, back, chest, thighs, and calves). Participants are first guided to learn and practice the correct movement postures, and once proficient, gradually progress to using resistance bands to increase intensity.
- (3) Balance Training: Tasks such as side stepping and targeted stepping drills to improve stability.
- (4) Flexibility Training: Stretching of the neck, shoulders, and waist to maintain mobility.
- (5) Aerobic Exercise: Structured aerobic routines to enhance cardiovascular endurance.
- (6) Mind–Body Exercise: Traditional practices including Tai Chi and Baduanjin to integrate body control and relaxation.
- (7) Fall Prevention Training: Functional activities to reduce fall risk in daily life.

According to the WHO Guidelines on Physical Activity and Sedentary Behaviour (World Health Organization, 2020), older adults (65 years and above) are recommended to engage in at least 150 minutes of moderate-intensity aerobic

physical activity, or at least 75 minutes of vigorous-intensity activity per week, in addition to muscle-strengthening activities on two or more days. In the intervention group, participants walked for an average of more than three hours per week. Based on this, a cumulative training in the training platform duration of more than 120 minutes per week was defined as excellent performance. Weekly training duration was automatically recorded by the system, and participants reaching this threshold were rewarded with 30 cognitive points which were displayed in their personal center under My Cognitive Points with detailed incentive records. On completion of each session, participants are prompted to report their fatigue level and any discomfort experienced, intervention staff could review participants' exercise duration and self-reported fatigue levels through the backend system, enabling personalized guidance and ensuring exercise safety (Figure 8).



Figure 8. The details of Cognitive Rehabilitation Module

References

[1] Yan, Y., Xu, Y., Wang, X., Wang, Y., Huang, C., Lin, R., Chen, M., Lin, M., & Li, H. (2024). The effect of multi-component exercise intervention in older people with

Parkinson's disease and mild cognitive impairment: A randomized controlled study. *Geriatric Nursing*, 60, 137–145. <https://doi.org/10.1016/j.gerinurse.2024.08.028>

[2] Li, N., Wang, N., Xu, Y., Lin, S., Yuan, Y., Huang, F., & Zhu, P. (2025). The impacts of a mHealth platform-enabled lifestyle-integrated multicomponent exercise program on reversing pre-frailty in community-dwelling older adults: A randomized controlled trial. *International Journal of Nursing Studies*, 167, 105072. <https://doi.org/10.1016/j.ijnurstu.2025.105072>

[3] Wu, T.-T., Wang, X.-X., Xu, Y.-F., Zhang, C.-F., Huang, M.-Z., & Li, H. (2025). The effect of resistance training for older adults with cognitive frailty: A randomized controlled trial. *BMC Geriatrics*. (In press).

III. Cognitive Stimulation Module

This module consists of two components—art classes and social interaction—designed to enhance hand–eye–brain coordination, stimulate imagination and creativity, promote interpersonal communication, and ultimately improve participants' cognitive and social functioning.

Art Classes

This module was developed based on the nurse-led staged integral art-based cognitive intervention program previously designed by the research team to address cognitive and psychological issues in older adults on the Alzheimer's disease spectrum [1]. The original program incorporated various art activities, including visual arts (e.g., painting, handicrafts, collage), performing arts (e.g., music, dance, drama), and literary arts (e.g., calligraphy, reading, poetry composition). In the current module, weekly art assignments are delivered via an H5 webpage integrating text, images, and video. Each week, participants are introduced to an art theme, engage in warm-up activities, and complete a creative task at home (e.g., producing an artwork). Assignments must be completed and uploaded to the platform within one week, in the form of images or videos. In addition, participants are required to provide a short description, which could be their creative inspiration, process, and experience.

Successful submission earns 20 cognitive points. To protect participants' privacy and intellectual property, they may choose whether to make their work public. In cases of illness, travel, or other valid reasons for absence, participants may contact intervention staff to reopen the submission window and resubmit their assignment.

Social Interaction

After successfully uploading their work, participants may access the social interaction module to view their own or other participants' public submissions. To encourage social engagement, participants are rewarded with +2 cognitive points for providing a comment on another participant's work and +1 cognitive point for giving a "like". These incentives are intended to foster active appreciation, peer feedback, and interactive participation (Figure 9).



Figure 9. The details of Cognitive stimulation Module

References:

[1] Yan, Y., Huang, C., Lin, R., Chen, M., Wang, Y., Xu, Y., Chao, Y., Zhang, C., Sun,

W., Wang, N., Ye, Y., Lin, M., & Li, H. (2024). Effects of a nurse-led staged integral art-based cognitive intervention for older adults on the Alzheimer's disease spectrum: A randomized controlled trial. *International journal of nursing studies*, 160, 104902.
<https://doi.org/10.1016/j.ijnurstu.2024.104902>

Appendix 5 . Subgroup Analysis of Intervention Efficacy Based on Demographic and Clinical Characteristics

I. General social-demographic characteristics

Table 1. Between-Group Comparisons of Outcome Changes by Educational Level Subgroup

Variables	Primary education					Secondary education					Tertiary education		
	Intervention group (n=22)	Control group (n=16)	t/Z	P	Intervention group (n=31)	Control group (n=41)	t/Z	P	Intervention group (n=30)	Control group (n=26)	t/Z	P	
MoCA	0.5 ± 3.02	-0.44 ± 3.14	0.929	0.359 ^a	0.26 ± 2.78	0.12 ± 2.89	0.201	0.841 ^a	0.27 ± 3.05	-1.96 ± 2.68	2.884	0.006 ^a	
AVLT-short delayed recall	0.91 ± 4.99	1.75 ± 4.19	-0.547	0.587 ^a	1.06 ± 5.66	-0.22 ± 4.43	1.080	0.284 ^a	-0.1 ± 5.09	-1.73 ± 4.92	1.214	0.230 ^a	
AVLT-long delayed recall	-0.36 ± 3.09	-0.31 ± 1.89	-0.059	0.954 ^a	0.1 ± 2.71	-0.73 ± 2.5	1.342	0.184 ^a	0.07 ± 3.07	-1.08 ± 2.42	1.531	0.132 ^a	
AVLT-recognition recall	-0.5 (-2.25, 2)	0 (-1, 1)	-0.928	0.353 ^b	0 (-2, 1)	0 (-2, 2)	-0.540	0.589 ^b	1 (-1, 1.25)	0 (-1.25, 1)	-1.383	0.167 ^b	
ROCFT-immediate recall	2.14 ± 7.11	0.25 ± 7.28	0.799	0.429 ^a	-0.29 ± 7.63	-3.49 ± 9.14	1.576	0.119 ^a	-0.3 ± 8.99	-3.23 ± 6.8	1.358	0.180 ^a	
ROCFT-long delayed recall	1.86 ± 7.38	-0.25 ± 5.4	0.971	0.338 ^a	-0.45 ± 7.58	-3.29 ± 9.44	1.374	0.174 ^a	0.1 ± 8.32	-4.54 ± 7.13	2.222	0.030 ^a	
ROCFT-copy time	15.5 (-46, 123.25)	-20.5 (-83.5, 47.25)	-1.405	0.160 ^b	9 (-32, 44)	23 (-5, 70)	-1.439	0.150 ^b	-36 (-93.25, 71.25)	10.5 (-98.75, 83.75)	-0.756	0.450 ^b	
VFT	2.09 ± 3.34	-1.13 ± 3.67	2.814	0.008 ^a	-0.16 ± 2.9	0.27 ± 3.11	-0.598	0.552 ^a	-0.83 ± 4.49	-0.62 ± 4.07	-0.189	0.851 ^a	
BNT	-0.5 (-3, 3.25)	0 (-1, 3)	-0.743	0.458 ^b	1 (-2, 3)	0 (-2, 2)	-0.543	0.587 ^b	1 (-1.5, 3)	-2 (-3, 1.25)	-1.981	0.048 ^b	
STT-A	-1.5 (-13.25, 15.25)	-1.5 (-10.75, 5.75)	-0.340	0.734 ^b	0 (-10, 11)	7 (-9, 22)	-1.536	0.124 ^b	0.5 (-12.75, 8.5)	9 (-8.5, 28.75)	-1.570	0.116 ^b	
STT-B	12.5 (-19.25, 24.75)	9.5 (-12.25, 29)	-0.192	0.848 ^b	10 (-11, 35)	19 (-37.5, 49.5)	-0.011	0.991 ^b	-34.5 (-57.75, 38)	7 (-19.25, 50.5)	-2.407	0.016 ^b	
GDS-15	-1 (-2.25, 1.25)	0 (-1, 1)	-0.854	0.393 ^b	0 (-1, 1)	0 (-1.5, 1)	-0.040	0.968 ^b	-1 (-3.25, 1)	0.5 (-1.25, 2)	-1.741	0.082 ^b	
SAS	-1.25 (-6.56, 4.06)	2.5 (-1.25, 8.44)	-1.510	0.131 ^b	1.25 (-2.5, 3.75)	1.25 (-5.82, 7.5)	-0.416	0.677 ^b	-1.25 (-6.56, 2.81)	0 (-5, 5.31)	-1.029	0.304 ^b	
UCLA loneliness scale	-6 (-15.25, 3)	2 (-11.5, 6)	-1.051	0.293 ^b	-1 (-8, 0)	0 (-5.5, 5.5)	-1.639	0.101 ^b	-4 (-10.75, 2.25)	0 (-6.25, 7)	-1.628	0.103 ^b	
QoL-AD	0.27 ± 5.28	4.06 ± 5.98	-2.067	0.046 ^a	4.35 ± 6.51	2.54 ± 6.66	1.159	0.251 ^a	1.17 ± 7.13	2.85 ± 6.82	-0.897	0.374 ^a	
ADL	0 (0, 1.25)	0 (0, 1)	-0.738	0.460 ^b	0 (0, 1)	0 (0, 1)	-0.203	0.839 ^b	0 (0, 1)	0 (0, 1)	-0.266	0.790 ^b	
BBS	0 (-2, 0)	-1 (-2, 0)	-0.686	0.493 ^b	0 (0, 1)	0 (-2, 1.5)	-1.105	0.269 ^b	-1 (-3, 0)	0 (-2, 1)	-1.299	0.194 ^b	
HPLP-II	5.95 ± 32.64	12 ± 27.95	-0.598	0.554 ^a	16.68 ± 32.27	15.95 ± 30.01	0.098	0.922 ^a	18.53 ± 22.85	19.23 ± 32.26	-0.094	0.925 ^a	
SARHP	13.5 (2.75, 29.5)	-3 (-22.5, 9.5)	-2.514	0.012 ^b	2 (-17, 21)	1 (-13, 27.5)	-0.722	0.470 ^b	2.5 (-15.75, 18.25)	-2 (-32, 5.25)	-1.947	0.051 ^b	

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P₂₅, P₇₅).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Table 2. Between-Group Comparisons of Outcome Changes by Gender Subgroup

Variables	Male				Female			
	Intervention group (n=21)	Control group (n=28)	t/Z	P	Intervention group (n=62)	Control group (n=55)	t/Z	P
MoCA	-0.05 ± 2.92	-0.61 ± 2.97	0.657	0.515 ^a	0.45 ± 2.92	-0.65 ± 3.02	2.013	0.046 ^a
AVLT-short delayed recall	1.19 ± 3.92	-0.68 ± 4.25	1.574	0.122 ^a	0.4 ± 5.65	-0.13 ± 4.87	0.541	0.590 ^a
AVLT-long delayed recall	0.1 ± 2.49	-0.54 ± 2.27	0.924	0.360 ^a	-0.08 ± 3.07	-0.87 ± 2.41	1.538	0.127 ^a
AVLT-recognition recall	1 (-2, 2.5)	0.5 (-1, 2)	-0.193	0.847 ^b	0 (-1, 1)	0 (-1, 1)	-0.374	0.708 ^b
ROCFT-immediate recall	-1.81 ± 6.97	-4.61 ± 7.58	1.323	0.192 ^a	1.08 ± 8.24	-1.71 ± 8.34	1.817	0.072 ^a
ROCFT-long delayed recall	2.19 ± 7.9	-4.43 ± 6.9	3.123	0.003 ^a	-0.26 ± 7.69	-2.42 ± 8.71	1.425	0.157 ^a
ROCFT-copy time	0 (-58.5, 62)	36 (-2.5, 70.75)	-1.647	0.100 ^b	9.5 (-80.25, 90.5)	7 (-42, 65)	-0.205	0.838 ^b
VFT	-1.76 ± 4.85	-0.07 ± 2.81	-1.535	0.131 ^a	0.85 ± 3.16	-0.38 ± 3.88	1.899	0.060 ^a
BNT	0 (-3, 1)	-0.5 (-3, 3)	-0.650	0.516 ^b	2 (-2, 3.25)	0 (-2, 2)	-1.710	0.087 ^b
STT-A	8 (-3.5, 16.5)	10.5 (-10.25, 22)	-0.202	0.840 ^b	-2 (-11.25, 7.25)	5 (-10, 20)	-1.816	0.069 ^b
STT-B	3 (-43, 45)	9 (-14.5, 55.5)	-0.606	0.544 ^b	10 (-38.25, 28.5)	11 (-21, 45)	-1.049	0.294 ^b
GDS-15	0 (-1.5, 2)	1 (-1, 2)	-0.820	0.412 ^b	-1 (-2, 0.25)	0 (-2, 1)	-0.828	0.408 ^b
SAS	0 (-3.75, 5)	3.75 (-3.44, 7.5)	-0.992	0.321 ^b	-0.88 (-5, 2.81)	1.25 (-5, 7.5)	-1.129	0.259 ^b
UCLA loneliness scale	-8 (-17, 1.5)	0.5 (-5.25, 6.75)	-2.155	0.031 ^b	-1.5 (-8.25, 0.5)	0 (-7, 6)	-1.685	0.092 ^b
QoL-AD	1.1 ± 7.09	1.04 ± 6.52	0.030	0.976 ^a	2.47 ± 6.47	3.89 ± 6.38	-1.195	0.234 ^a
ADL	0 (0, 0)	0 (0, 1)	-1.009	0.313 ^b	0 (0, 1)	0 (0, 1)	-0.891	0.373 ^b
BBS	0 (-2, 0)	0 (-2, 0)	-0.352	0.725 ^b	0 (-2, 0)	0 (-2, 1)	-0.319	0.750 ^b
HPLP-II	15.1 ± 22.64	13.68 ± 31.81	0.174	0.863 ^a	14.31 ± 31.55	17.51 ± 29.4	-0.566	0.573 ^a
SARHP	16 (-1, 27)	-0.5 (-27.25, 3)	-2.951	0.003 ^b	4 (-16.25, 21)	0 (-18, 23)	-0.508	0.611 ^b

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P_{25} , P_{75}).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Table 3. Between-Group Comparisons of Outcome Changes by Marital Status Subgroup

Variables	Married				Widowed/Divorced/Unmarried			
	Intervention group (n=73)	Control group (n=68)	t/Z	P	Intervention group (n=10)	Control group (n=15)	t/Z	P
MoCA	0.19 ± 2.85	-0.81 ± 3.14	1.986	0.049 ^a	1.3 ± 3.34	0.13 ± 2.1	1.077	0.292 ^a
AVLT-short delayed recall	0.88 ± 5.17	-0.78 ± 4.17	2.086	0.039 ^a	-1.4 ± 5.72	1.8 ± 6.14	-1.311	0.203 ^a
AVLT-long delayed recall	0.12 ± 2.77	-0.97 ± 2.42	2.488	0.014 ^a	-1.2 ± 3.82	0.2 ± 1.78	-1.240	0.228 ^a
AVLT-recognition recall	0 (-1, 1)	0 (-1, 2)	-0.046	0.963 ^b	-0.5 (-2, 1.25)	0 (-1, 1)	-0.423	0.672 ^b
ROCFT-immediate recall	0.38 ± 7.89	-3.01 ± 8.65	2.439	0.016 ^a	0.1 ± 9.18	-1.2 ± 5.43	0.446	0.660 ^a
ROCFT-long delayed recall	0.01 ± 7.73	-3.5 ± 8.57	2.560	0.012 ^a	2.9 ± 7.98	-1.27 ± 5.82	1.512	0.144 ^a
ROCFT-copy time	1 (-63.5, 84)	20 (-20.5, 70)	-0.959	0.337 ^b	16 (-66, 54)	-3 (-88, 69)	-0.277	0.782 ^b
VFT	0.36 ± 3.95	-0.32 ± 3.62	1.062	0.290 ^a	-1 ± 2.21	-0.07 ± 3.26	-0.789	0.438 ^a
BNT	1 (-2, 3)	0 (-2, 2)	-0.535	0.593 ^b	2.5 (-0.5, 4.25)	-1 (-3, 1)	-1.840	0.066 ^b
STT-A	0 (-10.5, 11)	6.5 (-9.5, 21.5)	-1.504	0.132 ^b	-1 (-14, 4)	2 (-11, 22)	-0.944	0.345 ^b
STT-B	10 (-33, 32.5)	17 (-17.5, 50.5)	-1.519	0.129 ^b	-25.5 (-54, 17.5)	-15 (-42, 16)	-0.333	0.739 ^b
GDS-15	-1 (-2, 1)	0 (-1, 1)	-1.252	0.210 ^b	0 (-1.25, 1.25)	1 (-2, 2)	-0.505	0.614 ^b
SAS	0 (-4.25, 3.75)	1.25 (-5, 7.5)	-1.586	0.113 ^b	0 (-3.75, 2.81)	1.25 (-6.25, 7.5)	-0.639	0.523 ^b
UCLA loneliness scale	-3 (-10.5, 0)	0.5 (-6, 6)	-2.654	0.008 ^b	-3 (-10, 2.75)	-1 (-7, 6)	-0.639	0.523 ^b
QoL-AD	1.66 ± 6.21	2.26 ± 6.45	-0.569	0.570 ^a	5.5 ± 8.68	5.93 ± 6.25	-0.145	0.886 ^a
ADL	0 (0, 1)	0 (0, 1)	-0.572	0.567 ^b	0 (0, 1)	1 (0, 1)	-0.453	0.651 ^b
BBS	0 (-2, 0)	0 (-2, 1)	-0.176	0.860 ^b	0 (-3.25, 1.25)	-2 (-2, 1)	-0.505	0.614 ^b
HPLP-II	13.85 ± 27.56	16.21 ± 32.42	-0.466	0.642 ^a	19.3 ± 42.25	16.27 ± 16.59	0.252	0.803 ^a
SARHP	6 (-7.5, 24.5)	-1.5 (-20.5, 11.75)	-2.338	0.019 ^b	-9.5 (-28, 11)	1 (-15, 14)	-0.805	0.421 ^b

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P_{25} , P_{75}).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Table 4. Between-Group Comparisons of Outcome Changes by Residence Status Subgroup

Variables	Living alone				Not living alone			
	Intervention group (n=7)	Control group (n=7)	t/Z	P	Intervention group (n=76)	Control group (n=76)	t/Z	P
MoCA	-0.29 ± 2.36	1.43 ± 2.37	-1.356	0.200 ^a	0.38 ± 2.96	-0.83 ± 2.98	2.513	0.013 ^a
AVLT-short delayed recall	-0.14 ± 6.23	3 ± 6.71	-0.908	0.382 ^a	0.67 ± 5.2	-0.62 ± 4.35	1.659	0.09 ^a
AVLT-long delayed recall	0.43 ± 2.94	0.14 ± 1.95	0.214	0.834 ^a	-0.08 ± 2.93	-0.84 ± 2.38	1.760	0.080 ^a
AVLT-recognition recall	1 (-1, 2)	0 (-2, 1)	-0.646	0.518 ^b	0 (-1.75, 1)	0 (-1, 2)	-0.197	0.843 ^b
ROCFT-immediate recall	-0.43 ± 9.54	-0.71 ± 8.86	0.058	0.955 ^a	0.42 ± 7.91	-2.87 ± 8.13	2.527	0.013 ^a
ROCFT-long delayed recall	2.14 ± 6.67	0.71 ± 7.7	0.371	0.717 ^a	0.2 ± 7.88	-3.45 ± 8.16	2.802	0.006 ^a
ROCFT-copy time	-32 (-93, 42)	-18 (-88, 28)	-0.192	0.848 ^b	7.5 (-60, 88.75)	21 (-20.5, 70)	-0.704	0.482 ^b
VFT	0.14 ± 1.46	-0.14 ± 2.19	0.287	0.779 ^a	0.2 ± 3.95	-0.29 ± 3.65	0.789	0.432 ^a
BNT	2 (1, 4)	0 (-1, 4)	-0.898	0.369 ^b	1 (-2, 3)	0 (-2, 2)	-1.020	0.308 ^b
STT-A	-6 (-23, 4)	2 (-5, 15)	-1.087	0.277 ^b	0 (-10.75, 10.75)	6 (-10, 22)	-1.539	0.124 ^b
STT-B	-51 (-68, -9)	7 (-42, 22)	-1.597	0.110 ^b	10 (-29, 34)	11 (-19.75, 48.75)	-0.934	0.350 ^b
GDS-15	-1 (-4, 0)	0 (-4, 1)	-0.720	0.471 ^b	0 (-1.75, 1)	0 (-1, 1.75)	-1.223	0.221 ^b
SAS	1.25 (-3.75, 3.75)	2.5 (-11.25, 7.5)	-0.064	0.949 ^b	-0.25 (-4.5, 3.75)	1.25 (-5, 7.5)	-1.720	0.086 ^b
UCLA loneliness scale	-5 (-7, 2)	-3 (-6, 6)	-0.321	0.748 ^b	-2.5 (-10.75, 0)	0.5 (-6, 6)	-2.663	0.008 ^b
QoL-AD	0.86 ± 8.43	3.71 ± 7.72	-0.661	0.521 ^a	2.24 ± 6.48	2.86 ± 6.47	-0.589	0.557 ^a
ADL	0 (0, 1)	0 (0, 0)	-0.523	0.601 ^b	0 (0, 1)	0 (0, 1)	-0.118	0.906 ^b
BBS	0 (-3, 1)	0 (-2, 2)	-0.452	0.651 ^b	0 (-2, 0)	0 (-2, 0.75)	-0.284	0.776 ^b
HPLP-II	27 ± 25.77	9.43 ± 30.03	1.175	0.263 ^a	13.36 ± 29.63	16.84 ± 30.22	-0.718	0.474 ^a
SARHP	-6 (-58, 21)	-6 (-30, 32)	-0.256	0.798 ^b	5 (-8.75, 24)	0 (-18, 11.75)	-2.077	0.038 ^b

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P_{25}, P_{75}).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

II. lifestyle habits and social participation factors

Table 5. Between-Group Comparisons of Outcome Changes by Smoking Subgroup

Variables	Never				Used to/Still			
	Intervention group (n=73)	Control group (n=72)	t/Z	P	Intervention group (n=10)	Control group (n=11)	t/Z	P
MoCA	0.47 ± 2.95	-0.68 ± 2.9	2.359	0.020 ^a	-0.7 ± 2.45	-0.36 ± 3.67	-0.244	0.810 ^a
AVLT-short delayed recall	0.77 ± 5.47	-0.1 ± 4.84	1.007	0.316 ^a	-0.6 ± 3.13	-1.73 ± 2.97	0.846	0.408 ^b
AVLT-long delayed recall	0.04 ± 2.97	-0.75 ± 2.42	1.756	0.081 ^a	-0.6 ± 2.55	-0.82 ± 1.99	0.220	0.828 ^a
AVLT-recognition recall	0 (-1.5, 1)	0 (-1, 1)	-0.042	0.966 ^b	1 (-1.25, 3)	1 (-1, 2)	-0.036	0.972 ^b
ROCFT-immediate recall	0.68 ± 7.94	-2.4 ± 8.19	2.305	0.023 ^a	-2.1 ± 8.4	-4.55 ± 8.14	0.677	0.506 ^a
ROCFT-long delayed recall	0.37 ± 7.56	-2.78 ± 8.26	2.394	0.018 ^a	0.3 ± 9.6	-5.18 ± 7.45	1.469	0.158 ^a
ROCFT-copy time	9 (-59, 78.5)	10.5 (-20.5, 69.5)	-0.579	0.562 ^b	0 (-72.5, 86.75)	21 (-62, 70)	-0.634	0.526 ^b
VFT	0.44 ± 3.48	-0.28 ± 3.62	1.214	0.227 ^a	-1.6 ± 5.54	-0.27 ± 3.13	-0.684	0.502 ^a
BNT	2 (-2, 3)	-0.5 (-2, 2)	-1.786	0.074 ^b	-0.5 (-2.25, 0.25)	2 (-2, 4)	-0.993	0.321 ^b
STT-A	-1 (-11, 8)	6 (-8, 22)	-2.270	0.023 ^b	10.5 (-4.75, 24)	1 (-17, 20)	-1.058	0.290 ^b
STT-B	8 (-38.5, 30.5)	11 (-20.75, 48)	-1.240	0.215 ^b	10 (-37.75, 35.25)	-1 (-11, 45)	-0.141	0.888 ^b
GDS-15	0 (-1, 1)	0 (-1, 1.75)	-1.087	0.277 ^b	-1 (-4.25, 0)	0 (-1, 1)	-1.214	0.225 ^b
SAS	0 (-3.25, 3.75)	1.25 (-5, 7.5)	-1.404	0.160 ^b	-3.13 (-11.88, 3.44)	1.25 (-5.39, 8.75)	-0.916	0.359 ^b
UCLA loneliness scale	-2 (-9.5, 2)	0.5 (-6, 6)	-2.362	0.018 ^b	-8 (-18.5, 0)	-1 (-7, 1)	-1.517	0.129 ^b
QoL-AD	1.78 ± 6.82	3.29 ± 6.44	-1.371	0.173 ^a	4.6 ± 4.3	0.55 ± 6.93	1.590	0.128 ^a
ADL	0 (0, 1)	0 (0, 1)	-0.062	0.950 ^b	0 (0, 1)	0 (0, 1)	-1.038	0.299 ^b
BBS	0 (-2, 0)	0 (-2, 1)	-0.016	0.987 ^b	0 (-2, 0)	0 (-2, 0)	-0.374	0.708 ^b
HPLP-II	14.41 ± 30.51	17.4 ± 31.28	-0.583	0.561 ^a	15.2 ± 20.98	8.45 ± 20.11	0.752	0.461 ^a
SARHP	5 (-15, 24)	0 (-21, 13.75)	-1.481	0.139 ^b	4.5 (-2.5, 26.25)	-4 (-15, 2)	-1.869	0.062 ^b

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P_{25} , P_{75}).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Table 6.Between-Group Comparisons of Outcome Changes by Alcohol Consumption Subgroup

Variables	Never				Used to/Still			
	Intervention group (n=65)	Control group (n=68)	t/Z	P	Intervention group (n=18)	Control group (n=15)	t/Z	P
MoCA	0.55 ± 3.04	-0.71 ± 2.9	2.444	0.016 ^a	-0.5 ± 2.26	-0.33 ± 3.44	-0.167	0.868 ^a
AVLT-short delayed recall	0.66 ± 5.61	-0.32 ± 4.82	1.088	0.279 ^a	0.39 ± 3.82	-0.27 ± 3.94	0.484	0.632 ^a
AVLT-long delayed recall	0.05 ± 3.02	-0.71 ± 2.32	1.612	0.109 ^a	-0.33 ± 2.57	-1 ± 2.56	0.743	0.463 ^a
AVLT-recognition recall	0 (-1, 1)	0 (-1, 1)	-0.460	0.645 ^b	0.5 (-2, 1.5)	1 (0, 2)	-0.822	0.411 ^b
ROCFT-immediate recall	0.78 ± 7.92	-2.53 ± 8.58	2.312	0.022 ^a	-1.22 ± 8.3	-3.4 ± 6.14	0.842	0.407 ^a
ROCFT-long delayed recall	0.22 ± 7.83	-2.78 ± 8.56	2.103	0.037 ^a	0.89 ± 7.73	-4.53 ± 6.03	2.211	0.035 ^a
ROCFT-copy time	6 (-59, 78.5)	13 (-20.5, 67.25)	-0.329	0.742 ^b	2 (-72.5, 86.75)	42 (-41, 71)	-1.013	0.311 ^b
VFT	0.63 ± 3.43	-0.49 ± 3.73	1.793	0.075 ^a	-1.39 ± 4.68	0.67 ± 2.41	-1.537	0.134 ^a
BNT	1 (-2, 3)	-1 (-2, 2)	-1.454	0.146 ^b	1 (-0.25, 2)	2 (-2, 4)	-0.728	0.467 ^b
STT-A	-2 (-11.5, 8)	5.5 (-9.5, 22)	-2.202	0.028 ^b	7 (-2.25, 24)	7 (-11, 20)	-0.489	0.625 ^b
STT-B	10 (-41, 30.5)	9.5 (-20.75, 43.75)	-0.916	0.360 ^b	3.5 (-17.5, 35.25)	25 (-11, 69)	-1.013	0.311 ^b
GDS-15	0 (-1, 1)	0 (-1.75, 1.75)	-1.043	0.297 ^b	-0.5 (-4.25, 2)	0 (-1, 1)	-0.967	0.334 ^b
SAS	0 (-3.25, 3.75)	1.88 (-5, 7.5)	-1.269	0.205 ^b	-2.5 (-11.88, 1.88)	0 (-5.39, 7.5)	-1.177	0.239 ^b
UCLA loneliness scale	-1 (-8.5, 2)	0.5 (-6.75, 6)	-1.984	0.047 ^b	-8 (-16, 0)	0 (-3, 3)	-2.212	0.027 ^b
QoL-AD	1.91 ± 6.94	3.4 ± 6.37	-1.291	0.199 ^a	2.89 ± 5.38	0.8 ± 7.07	0.963	0.343 ^a
ADL	0 (0, 1)	0 (0, 1)	-0.502	0.615 ^b	0 (0, 1.25)	0 (0, 0)	-1.792	0.073 ^b
BBS	0 (-2, 0)	-0.5 (-2, 1)	-0.311	0.756 ^b	-0.5 (-2, 0)	0 (-2, 0)	-0.377	0.706 ^b
HPLP-II	15.63 ± 31.26	18.46 ± 31.58	-0.518	0.605 ^a	10.44 ± 21.81	6.07 ± 19.91	0.597	0.555 ^a
SARHP	4 (-17, 24)	0 (-21, 17.75)	-1.035	0.300 ^b	7.5 (-0.5, 24.25)	-1 (-17, 3)	-2.477	0.013 ^b

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P_{25} , P_{75}).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Table 7. Between-Group Comparisons of Outcome Changes by Physical Activities Subgroup

Variables	Never/Occasionally				Often/Active Participation			
	Intervention group (n=20)	Control group (n=19)	t/Z	P	Intervention group (n=63)	Control group (n=64)	t/Z	P
MoCA	-0.1 ± 2.38	-1.21 ± 2.23	1.502	0.141 ^a	0.46 ± 3.06	-0.47 ± 3.17	1.679	0.096 ^a
AVLT-short delayed recall	1.65 ± 4.92	0.84 ± 5.12	0.502	0.619 ^a	0.27 ± 5.35	-0.66 ± 4.49	1.058	0.292 ^a
AVLT-long delayed recall	-0.6 ± 3.27	-0.11 ± 2.21	-0.551	0.585 ^a	0.14 ± 2.8	-0.95 ± 2.38	2.376	0.019 ^a
AVLT-recognition recall	0 (-1.75, 1)	0 (-3, 2)	-0.398	0.691 ^b	0 (-1, 2)	0 (-1, 1)	-0.288	0.774 ^b
ROCFT-immediate recall	0.2 ± 10.31	-2 ± 10.62	0.656	0.516 ^a	0.4 ± 7.21	-2.89 ± 7.37	2.540	0.012 ^a
ROCFT-long delayed recall	-1.3 ± 7.14	-2 ± 9.43	0.262	0.795 ^a	0.89 ± 7.94	-3.42 ± 7.79	3.088	0.002 ^a
ROCFT-copy time	52 (-83, 122.25)	24 (-14, 57)	-0.703	0.482 ^b	0 (-61, 52)	10.5 (-40, 70)	-1.234	0.217 ^b
VFT	0 ± 3.2	-0.89 ± 3.77	0.801	0.428 ^a	0.25 ± 4	-0.09 ± 3.48	0.523	0.602 ^a
BNT	1 (-0.75, 2.75)	1 (-1, 3)	-0.028	0.977 ^b	1 (-3, 3)	-1 (-2, 2)	-1.092	0.275 ^b
STT-A	-1.5 (-7.75, 10.75)	6 (-8, 28)	-1.069	0.285 ^b	0 (-11, 10)	5.5 (-10, 21.75)	-1.285	0.199 ^b
STT-B	-6.5 (-41.75, 44)	19 (-49, 34)	-0.281	0.779 ^b	10 (-37, 30)	9.5 (-16.5, 48.75)	-1.244	0.213 ^b
GDS-15	-1 (-5.5, 0.75)	0 (-2, 1)	-1.061	0.289 ^b	0 (-1, 1)	0 (-1, 1.75)	-1.104	0.269 ^b
SAS	0.5 (-7.19, 3.44)	2.5 (-5, 7.5)	-0.816	0.414 ^b	-1.25 (-3.75, 3.75)	1.25 (-5, 7.5)	-1.461	0.144 ^b
UCLA loneliness scale	-6.5 (-16, 1.5)	0 (-8, 4)	-1.212	0.225 ^b	-2 (-8, 0)	1 (-6, 6)	-2.361	0.018 ^b
QoL-AD	3.45 ± 6.64	2.16 ± 6.31	0.622	0.538 ^a	1.7 ± 6.6	3.16 ± 6.63	-1.242	0.217 ^a
ADL	0.5 (0, 2)	0 (0, 1)	-0.772	0.440 ^b	0 (0, 1)	0 (0, 1)	-0.111	0.912 ^b
BBS	0 (-1.75, 0)	0 (-2, 2)	-1.098	0.272 ^b	0 (-2, 0)	0 (-2, 0)	-0.763	0.445 ^b
HPLP-II	19 ± 27.76	23.53 ± 32.82	-0.466	0.644 ^a	13.08 ± 30.01	14.05 ± 29.16	-0.184	0.854 ^a
SARHP	7.5 (-7.5, 26.75)	1 (-23, 39)	-0.520	0.603 ^b	4 (-17, 24)	-0.5 (-18.75, 10.5)	-1.763	0.078 ^b

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P_{25}, P_{75}).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Table 8. Between-Group Comparisons of Outcome Changes by Leisure Intellectual Activities Subgroup

Variables	Never/Occasionally				Often/Active Participation			
	Intervention group (n=51)	Control group (n=52)	t/Z	P	Intervention group (n=32)	Control group (n=31)	t/Z	P
MoCA	0.43 ± 2.73	-0.38 ± 3.05	1.430	0.156 ^a	0.16 ± 3.21	-1.06 ± 2.87	1.587	0.118 ^a
AVLT-short delayed recall	1.39 ± 5.44	-0.17 ± 5.07	1.511	0.134 ^a	-0.66 ± 4.76	-0.55 ± 3.91	-0.098	0.922 ^a
AVLT-long delayed recall	-0.04 ± 3.24	-0.62 ± 2.43	1.023	0.309 ^a	-0.03 ± 2.38	-1 ± 2.25	1.660	0.102 ^a
AVLT-recognition recall	0 (-1, 1)	0 (-1, 1)	-0.280	0.779 ^b	0 (-2, 1)	0 (-1, 2)	-0.389	0.697 ^b
ROCFT-immediate recall	-0.45 ± 7.6	-2.67 ± 8.54	1.393	0.167 ^a	1.63 ± 8.56	-2.71 ± 7.62	2.121	0.038 ^a
ROCFT-long delayed recall	-0.47 ± 6.82	-2.52 ± 8.03	1.395	0.166 ^a	1.69 ± 9.03	-4.06 ± 8.41	2.613	0.011 ^a
ROCFT-copy time	0 (-66, 60)	21 (-30.75, 65)	-0.848	0.397 ^b	16.5 (-60, 96.25)	7 (-37, 82)	-0.316	0.752 ^b
VFT	0 ± 3.63	-0.52 ± 3.7	0.719	0.474 ^a	0.5 ± 4.1	0.13 ± 3.28	0.396	0.694 ^a
BNT	1 (-1, 3)	-0.5 (-2, 2)	-1.536	0.125 ^b	0 (-3, 3.75)	0 (-2, 2)	-0.076	0.939 ^b
STT-A	1 (-8, 12)	0.5 (-11, 19.75)	-0.145	0.885 ^b	-2.5 (-22, 4)	9 (-2, 22)	-2.744	0.006 ^b
STT-B	10 (-43, 31)	9.5 (-20.75, 38.5)	-0.205	0.838 ^b	-1 (-37.75, 18)	19 (-15, 59)	-1.685	0.092 ^b
GDS-15	0 (-2, 1)	0 (-2, 1)	-0.316	0.752 ^b	-0.5 (-1.75, 1)	1 (-1, 2)	-2.036	0.042 ^b
SAS	-0.5 (-4.75, 2.5)	0 (-6.04, 7.5)	-0.436	0.663 ^b	0 (-2.69, 3.75)	2.5 (0, 7.5)	-2.149	0.032 ^b
UCLA loneliness scale	-2 (-11, 2)	-1 (-8.75, 4.75)	-0.370	0.711 ^b	-4.5 (-10, 0)	4 (0, 7)	-3.974	<0.001 ^b
QoL-AD	3.08 ± 6.8	3.35 ± 7.26	-0.193	0.847 ^a	0.59 ± 6.1	2.23 ± 5.12	-1.148	0.255 ^a
ADL	0 (0, 1)	0 (0, 1)	-0.532	0.595 ^b	0 (0, 1)	0 (0, 1)	-0.189	0.850 ^b
BBS	0 (-1, 0)	0 (-2, 1)	-0.646	0.519 ^b	0 (-2, 0)	0 (-2, 0)	-0.678	0.498 ^b
HPLP-II	11.86 ± 28.42	18.04 ± 29.18	-1.088	0.279 ^a	18.72 ± 30.95	13.16 ± 31.82	0.703	0.485 ^a
SARHP	7 (-6, 24)	0.5 (-16.5, 23)	-1.230	0.219 ^b	3.5 (-21.5, 24)	-4 (-21, 3)	-1.396	0.163 ^b

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P_{25} , P_{75}).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Table9. Between-Group Comparisons of Outcome Changes by Organized Group Activities Subgroup

Variables	Never/Occasionally				Often/Active Participation			
	Intervention group (n=57)	Control group (n=63)	t/Z	P	Intervention group (n=26)	Control group (n=20)	t/Z	P
MoCA	0.19 ± 2.93	-0.43 ± 2.91	1.165	0.246 ^a	0.62 ± 2.9	-1.3 ± 3.21	2.119	0.040 ^a
AVLT-short delayed recall	0.67 ± 5.38	-0.35 ± 4.98	1.075	0.285 ^a	0.46 ± 5.07	-0.2 ± 3.53	0.497	0.621 ^a
AVLT-long delayed recall	0.04 ± 2.9	-0.62 ± 2.36	1.360	0.176 ^a	-0.19 ± 3.01	-1.2 ± 2.35	1.235	0.223 ^a
AVLT-recognition recall	0 (-2, 1)	0 (-1, 2)	-1.162	0.245 ^b	0 (-1, 2)	-1 (-2.75, 0)	-1.862	0.063 ^b
ROCFT-immediate recall	-0.19 ± 7.94	-3.25 ± 8.29	2.061	0.042 ^a	1.54 ± 8.16	-0.9 ± 7.66	1.031	0.308 ^a
ROCFT-long delayed recall	0.11 ± 7.45	-3.06 ± 8.12	2.220	0.028 ^a	0.92 ± 8.55	-3.2 ± 8.5	1.626	0.111 ^a
ROCFT-copy time	9 (-67, 90.5)	21 (-41, 67)	-0.055	0.956 ^b	-7.5 (-62.25, 60.25)	10.5 (-4.5, 96.25)	-1.418	0.156 ^b
VFT	-0.07 ± 3.78	-0.38 ± 3.36	0.476	0.635 ^a	0.77 ± 3.85	0.05 ± 4.14	0.608	0.546 ^a
BNT	1 (-2.5, 3)	0 (-2, 2)	-0.330	0.741 ^b	2 (-1.25, 4)	-2 (-3, 2)	-1.592	0.111 ^b
STT-A	1 (-11, 11)	6 (-8, 22)	-1.430	0.153 ^b	-1.5 (-11.5, 4.75)	3.5 (-16, 21.75)	-0.554	0.579 ^b
STT-B	10 (-37.5, 30)	8 (-21, 43)	-0.426	0.670 ^b	-3.5 (-45.5, 38)	27.5 (-10.25, 67)	-1.895	0.058 ^b
GDS-15	0 (-2, 1)	0 (-1, 1)	-1.115	0.265 ^b	-0.5 (-1, 0.25)	0 (-1.75, 2)	-0.923	0.356 ^b
SAS	0 (-5.63, 4.38)	1.25 (-5, 7.5)	-1.157	0.247 ^b	-1.25 (-2.5, 1.56)	1.25 (-1.25, 6.25)	-1.536	0.125 ^b
UCLA loneliness scale	-2 (-9.5, 2.5)	0 (-7, 6)	-1.315	0.188 ^b	-4.5 (-11, 0)	3.5 (0, 5.75)	-3.235	0.001 ^b
QoL-AD	2.4 ± 6.08	3.44 ± 6.43	-0.909	0.365 ^a	1.5 ± 7.75	1.3 ± 6.75	0.092	0.927 ^a
ADL	0 (0, 1)	0 (0, 1)	-0.398	0.690 ^b	0 (0, 1)	0 (0, 1)	-0.134	0.893 ^b
BBS	0 (-2, 0)	-1 (-2, 1)	-0.594	0.552 ^b	0 (-2, 0)	0 (-2, 0.75)	-0.854	0.393 ^b
HPLP-II	15.19 ± 29.85	15.35 ± 26.25	-0.031	0.976 ^a	13 ± 29	18.95 ± 40.63	-0.580	0.565 ^a
SARHP	6 (-8.5, 26)	1 (-15, 23)	-0.886	0.376 ^b	4 (-18, 22.5)	-15.5 (-27, 1.75)	-2.340	0.019 ^b

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P_{25} , P_{75}).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Table 10. Between-Group Comparisons of Outcome Changes by Children interactions Subgroup

Variables	Rarely/Occasionally				Often			
	Intervention group (n=15)	Control group (n=19)	t/Z	P	Intervention group (n=68)	Control group (n=64)	t/Z	P
MoCA	1.27 ± 2.25	-0.37 ± 3.27	1.650	0.109 ^a	0.12 ± 3.01	-0.72 ± 2.92	1.619	0.108 ^a
AVLT-short delayed recall	1.2 ± 3.9	-0.74 ± 4.51	1.319	0.196 ^a	0.47 ± 5.52	-0.19 ± 4.72	0.734	0.464 ^a
AVLT-long delayed recall	-0.07 ± 2.46	-1.16 ± 2.41	1.298	0.203 ^a	-0.03 ± 3.03	-0.64 ± 2.35	1.291	0.199 ^a
AVLT-recognition recall	1 (-2, 2)	0 (-3, 2)	-0.982	0.326 ^b	0 (-1, 1)	0 (-1, 1.75)	-0.514	0.607 ^b
ROCFT-immediate recall	-2.07 ± 8.9	-1.68 ± 8.83	-0.125	0.901 ^a	0.88 ± 7.76	-2.98 ± 8	2.818	0.006 ^a
ROCFT-long delayed recall	2.13 ± 7.66	-2.37 ± 8.47	1.604	0.119 ^a	-0.03 ± 7.79	-3.31 ± 8.12	2.371	0.019 ^a
ROCFT-copy time	-37 (-93, 41)	14 (-21, 88)	-1.544	0.123 ^b	11.5 (-54, 88.75)	20 (-36.5, 68.75)	-0.157	0.875 ^b
VFT	-2.13 ± 4.44	-0.95 ± 3.5	-0.872	0.390 ^a	0.71 ± 3.48	-0.08 ± 3.56	1.280	0.203 ^a
BNT	0 (-1, 2)	0 (-2, 3)	-0.035	0.972 ^b	1 (-2, 3)	-0.5 (-2, 2)	-1.409	0.159 ^b
STT-A	4 (-16, 17)	9 (-8, 22)	-1.041	0.298 ^b	0 (-9.75, 9.5)	4.5 (-10.75, 20.75)	-1.330	0.184 ^b
STT-B	28 (-51, 51)	8 (-15, 61)	-0.277	0.781 ^b	7 (-35.75, 22.75)	11 (-25.5, 43.75)	-1.296	0.195 ^b
GDS-15	-1 (-4, 1)	0 (-2, 1)	-0.754	0.451 ^b	0 (-1, 1)	0 (-1, 2)	-1.278	0.201 ^b
SAS	1.25 (0, 6.25)	1.25 (-5, 5)	-0.888	0.375 ^b	-1.25 (-5, 2.5)	1.25 (-5, 7.5)	-2.076	0.038 ^b
UCLA loneliness scale	-6 (-11, 0)	0 (-3, 10)	-1.703	0.089 ^b	-2 (-10, 1.5)	0 (-6, 5.75)	-2.054	0.040 ^b
QoL-AD	2.93 ± 5.96	1.89 ± 6.31	0.488	0.629 ^a	1.94 ± 6.78	3.23 ± 6.62	-1.108	0.270 ^a
ADL	0 (0, 1)	0 (0, 1)	-0.094	0.925 ^b	0 (0, 1)	0 (0, 1)	-0.349	0.727 ^b
BBS	-1 (-2, 1)	0 (-1, 2)	-0.596	0.551 ^b	0 (-2, 0)	-0.5 (-2, 0)	-0.513	0.608 ^b
HPLP-II	14.27 ± 26.74	15.74 ± 36.44	-0.131	0.897 ^a	14.56 ± 30.17	16.36 ± 28.28	-0.353	0.724 ^a
SARHP	4 (-27, 24)	-4 (-29, 7)	-0.694	0.488 ^b	5.5 (-8.75, 24)	0 (-16.75, 12.75)	-1.721	0.085 ^b

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P_{25}, P_{75}).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Table 11. Between-Group Comparisons of Outcome Changes by Friends interactions Subgroup

Variables	Rarely/Occasionally				Often			
	Intervention group (n=15)	Control group (n=15)	t/Z	P	Intervention group (n=68)	Control group (n=68)	t/Z	P
MoCA	0.33 ± 2.44	0.13 ± 2.47	0.223	0.825 ^a	0.32 ± 3.02	-0.81 ± 3.08	2.166	0.032 ^a
AVLT-short delayed recall	0.33 ± 3.83	0.2 ± 4.54	0.087	0.931 ^a	0.66 ± 5.54	-0.43 ± 4.7	1.235	0.219 ^a
AVLT-long delayed recall	0.53 ± 2.72	0.2 ± 1.74	0.400	0.692 ^a	-0.16 ± 2.97	-0.97 ± 2.43	1.739	0.084 ^a
AVLT-recognition recall	1 (0, 1)	1 (-1, 2)	-0.530	0.596 ^b	0 (-2, 1)	0 (-1, 1)	-0.073	0.942 ^b
ROCFT-immediate recall	-2.53 ± 7.61	-0.93 ± 6.71	-0.610	0.546 ^a	0.99 ± 8	-3.07 ± 8.44	2.878	0.005 ^a
ROCFT-long delayed recall	-1 ± 6.41	-0.87 ± 7.43	-0.053	0.958 ^a	0.66 ± 8.05	-3.59 ± 8.28	3.036	0.003 ^a
ROCFT-copy time	-13 (-66, 42)	55 (-2, 88)	-1.929	0.054 ^b	7.5 (-60, 88.75)	10.5 (-36.5, 67.75)	-0.078	0.938 ^b
VFT	-2.07 ± 4.62	-0.67 ± 3.22	-0.963	0.344 ^a	0.69 ± 3.44	-0.19 ± 3.63	1.456	0.148 ^a
BNT	1 (-4, 3)	1 (-2, 3)	-0.771	0.440 ^b	1 (-2, 3)	-0.5 (-2, 2)	-1.753	0.080 ^b
STT-A	4 (-9, 22)	1 (-11, 22)	-0.457	0.648 ^b	-1 (-11, 9.5)	6 (-8, 21.75)	-2.148	0.032 ^b
STT-B	18 (-54, 45)	-6 (-49, 48)	-0.270	0.787 ^b	9 (-35.75, 26.25)	11 (-16.5, 47.5)	-1.674	0.094 ^b
GDS-15	0 (-1, 1)	0 (-2, 1)	-0.105	0.916 ^b	-1 (-2, 1)	0 (-1, 1.75)	-1.509	0.131 ^b
SAS	1.25 (-2.5, 6.25)	1.25 (-6.25, 5)	-0.770	0.441 ^b	-1.25 (-5, 3.75)	1.25 (-4.69, 7.5)	-2.166	0.030 ^b
UCLA loneliness scale	0 (-5, 3)	-4 (-25, 6)	-1.247	0.212 ^b	-4.5 (-11.75, 0)	1 (-4.5, 6)	-3.553	<0.001 ^b
QoL-AD	2.4 ± 5.28	1.6 ± 7.04	0.352	0.727 ^a	2.06 ± 6.91	3.22 ± 6.43	-1.015	0.312 ^a
ADL	0 (0, 0)	0 (0, 1)	-1.872	0.061 ^b	0 (0, 1)	0 (0, 1)	-1.293	0.196 ^b
BBS	0 (-2, 1)	0 (-4, 2)	-0.273	0.785 ^b	0 (-2, 0)	-1 (-2, 0)	-0.368	0.713 ^b
HPLP-II	13.93 ± 30.49	5.53 ± 30.38	0.756	0.456 ^a	14.63 ± 29.42	18.57 ± 29.74	-0.777	0.439 ^a
SARHP	-14 (-27, 24)	3 (-6, 40)	-0.747	0.455 ^b	5.5 (-6, 24)	-2 (-20.5, 10.5)	-2.706	0.007 ^b

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P_{25}, P_{75}).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

III. Medical history information

Table 12. Between-Group Comparisons of Outcome Changes by Stroke Subgroup

Variables	No				Yes			
	Intervention group (n=75)	Control group (n=76)	t/Z	P	Intervention group (n=8)	Control group (n=7)	t/Z	P
MoCA	0.33 ± 2.99	-0.82 ± 3	2.358	0.020 ^a	0.25 ± 2.19	1.29 ± 2.14	-0.924	0.372 ^a
AVLT-short delayed recall	0.57 ± 5.47	-0.36 ± 4.78	1.112	0.268 ^a	0.88 ± 2.64	0.14 ± 3.18	0.487	0.634 ^a
AVLT-long delayed recall	-0.04 ± 2.97	-0.82 ± 2.38	1.775	0.078 ^a	0 ± 2.62	-0.14 ± 2.19	0.114	0.911 ^a
AVLT-recognition recall	0 (-1, 1)	0 (-1, 1)	-0.714	0.475 ^b	-2.5 (-3.75, 0)	1 (-3, 3)	-1.945	0.052 ^b
ROCFT-immediate recall	0.23 ± 7.89	-2.57 ± 8.22	2.130	0.035 ^a	1.5 ± 9.49	-4 ± 8.02	1.202	0.251 ^a
ROCFT-long delayed recall	0.59 ± 7.51	-2.86 ± 8.26	2.679	0.008 ^a	-1.75 ± 10.25	-5.71 ± 6.97	0.862	0.404 ^a
ROCFT-copy time	0 (-77, 72)	10.5 (-36.5, 68.75)	-1.079	0.280 ^b	56.5 (15.5, 147.5)	57 (7, 89)	-0.521	0.602 ^b
VFT	0.09 ± 3.86	-0.39 ± 3.55	0.809	0.420 ^a	1.13 ± 3.27	1 ± 3.46	0.072	0.944 ^a
BNT	1 (-2, 3)	0 (-2, 2)	-1.391	0.164 ^b	-1 (-2.75, 2.25)	0 (-3, 2)	-0.117	0.907 ^b
STT-A	0 (-10, 11)	6 (-9.5, 21.75)	-1.576	0.115 ^b	-5 (-17.75, 7)	-7 (-10, 25)	-1.157	0.247 ^b
STT-B	4 (-39, 35)	9.5 (-20.75, 48)	-1.239	0.215 ^b	11.5 (-26.5, 17)	11 (-19, 34)	-0.579	0.562 ^b
GDS-15	-1 (-2, 1)	0 (-1, 1.75)	-1.522	0.128 ^b	0 (-1.75, 1.75)	0 (-2, 1)	-0.117	0.907 ^b
SAS	-0.5 (-4.75, 3.75)	1.25 (-5, 7.5)	-1.450	0.147 ^b	0.63 (-2.69, 8.75)	3.75 (2.5, 7.5)	-1.044	0.296 ^b
UCLA loneliness scale	-4 (-11, 0)	0 (-6, 6)	-2.753	0.006 ^b	0 (-7.75, 2.75)	1 (-19, 4)	-0.290	0.772 ^b
QoL-AD	2.09 ± 6.79	2.84 ± 6.68	-0.683	0.496 ^a	2.38 ± 5.04	3.86 ± 4.88	-0.577	0.574 ^a
ADL	0 (0, 1)	0 (0, 1)	-0.494	0.621 ^b	0 (0, 1)	1 (0, 1)	-0.735	0.462 ^b
BBS	0 (-2, 0)	0 (-2, 1)	-0.239	0.811 ^b	-1 (-2, 0.75)	0 (-2, 1)	-0.303	0.762 ^b
HPLP-II	15.85 ± 28.89	14.39 ± 29.75	0.306	0.760 ^a	1.88 ± 33.48	36 ± 28.55	-2.106	0.055 ^a
SARHP	5 (-8, 22)	0 (-18, 12.75)	-1.597	0.110 ^b	5.5 (-16.75, 31)	-7 (-52, 0)	-1.157	0.247 ^b

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P_{25} , P_{75}).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Table 13. Between-Group Comparisons of Outcome Changes by Diabetes Mellitus Subgroup

Variables	No				Yes			
	Intervention group (n=60)	Control group (n=58)	t/Z	P	Intervention group (n=23)	Control group (n=25)	t/Z	P
MoCA	0.18 ± 2.97	-0.72 ± 2.86	1.692	0.093 ^a	0.7 ± 2.79	-0.44 ± 3.32	1.278	0.208 ^a
AVLT-short delayed recall	0.23 ± 4.76	-0.88 ± 4.52	1.301	0.196 ^a	1.57 ± 6.37	1 ± 4.78	0.349	0.728 ^a
AVLT-long delayed recall	-0.15 ± 3.12	-0.83 ± 2.39	1.323	0.189 ^a	0.26 ± 2.36	-0.6 ± 2.33	1.272	0.210 ^a
AVLT-recognition recall	0 (-1.75, 1)	0 (-2, 1.25)	-0.076	0.939 ^b	0 (-1, 1)	0 (-1, 2)	-0.063	0.950 ^b
ROCFT-immediate recall	0.27 ± 7.53	-3.9 ± 7.82	2.947	0.004 ^a	0.57 ± 9.29	0.12 ± 8.42	0.174	0.862 ^a
ROCFT-long delayed recall	0.27 ± 8.01	-3.59 ± 8.21	2.580	0.011 ^a	0.61 ± 7.26	-1.96 ± 8.08	1.155	0.254 ^a
ROCFT-copy time	9.5 (-74.25, 91.5)	10.5 (-18.25, 70.25)	-0.396	0.692 ^b	-15 (-56, 42)	23 (-64, 69.5)	-0.753	0.451 ^b
VFT	0.38 ± 3.76	-0.59 ± 3.47	1.452	0.149 ^a	-0.3 ± 3.94	0.44 ± 3.66	-0.679	0.501 ^a
BNT	0.5 (-2.75, 3)	0 (-2, 2)	-0.308	0.758 ^b	2 (-1, 4)	0 (-2, 2.5)	-1.867	0.062 ^b
STT-A	-1 (-11.75, 8)	6 (-10, 22.75)	-2.068	0.039 ^b	1 (-6, 12)	1 (-7.5, 19)	-0.176	0.861 ^b
STT-B	3.5 (-38.75, 26.25)	7 (-22.5, 45.75)	-1.015	0.310 ^b	13 (-37, 38)	22 (-11.5, 56)	-0.805	0.421 ^b
GDS-15	-1 (-2, 1)	0 (-1, 2)	-2.341	0.019 ^b	0 (-1, 2)	-1 (-2, 1)	-1.036	0.300 ^b
SAS	0.5 (-3.5, 3.75)	1.88 (-2.5, 7.5)	-1.491	0.136 ^b	-2.5 (-6.25, 1.25)	1.25 (-8.13, 7.5)	-0.558	0.577 ^b
UCLA loneliness scale	-4.5 (-10.75, 0)	0 (-7, 6)	-2.482	0.013 ^b	-2 (-10, 2)	1 (-4.5, 5.5)	-0.909	0.363 ^b
QoL-AD	2.6 ± 6.44	1.69 ± 6.4	0.770	0.443 ^a	0.87 ± 7.03	5.8 ± 6.02	-2.615	0.012 ^a
ADL	0 (0, 1)	0 (0, 1)	-0.605	0.545 ^b	0 (0, 0)	0 (0, 1)	-0.546	0.585 ^b
BBS	0 (-2, 0)	0 (-2, 1)	-0.006	0.996 ^b	0 (-1, 0)	0 (-2, 1)	-0.233	0.816 ^b
HPLP-II	12.93 ± 28.52	16.84 ± 30.21	-0.723	0.471 ^a	18.61 ± 31.96	14.76 ± 30.4	0.428	0.671 ^a
SARHP	4 (-12, 23.5)	-1.5 (-21.5, 12.5)	-1.551	0.121 ^b	6 (-13, 24)	1 (-17.5, 11)	-1.156	0.248 ^b

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P_{25}, P_{75}).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Table 14. Between-Group Comparisons of Outcome Changes by Hypertension Subgroup

Variables	No				Yes			
	Intervention group (n=37)	Control group (n=43)	t/Z	P	Intervention group (n=46)	Control group (n=40)	t/Z	P
MoCA	0.05 ± 2.93	-0.53 ± 3.23	0.848	0.399 ^a	0.54 ± 2.9	-0.75 ± 2.73	2.117	0.037 ^a
AVLT-short delayed recall	0.62 ± 5.5	-0.07 ± 4.99	0.589	0.557 ^a	0.59 ± 5.1	-0.58 ± 4.31	1.132	0.261 ^a
AVLT-long delayed recall	0.19 ± 3.54	-0.79 ± 2.55	1.434	0.156 ^a	-0.22 ± 2.33	-0.73 ± 2.16	1.043	0.300 ^a
AVLT-recognition recall	0 (-1, 1)	0 (-1, 2)	-0.078	0.938 ^b	0 (-2, 1)	0 (-1, 1.75)	-0.053	0.958 ^b
ROCFT-immediate recall	0.92 ± 8.66	-1.6 ± 7.88	1.364	0.177 ^a	-0.11 ± 7.49	-3.85 ± 8.4	2.184	0.032 ^a
ROCFT-long delayed recall	0.22 ± 7.44	-2.42 ± 8.34	1.480	0.143 ^a	0.48 ± 8.1	-3.83 ± 7.99	2.472	0.015 ^a
ROCFT-copy time	9 (-47.5, 65.5)	3 (-65, 57)	-0.526	0.599 ^b	0 (-93.25, 98.5)	23.5 (-12.25, 88.75)	-1.598	0.110 ^b
VFT	0.32 ± 3.65	-0.53 ± 3.37	1.094	0.277 ^a	0.09 ± 3.95	0 ± 3.74	0.104	0.917 ^a
BNT	1 (-2, 3)	0 (-2, 3)	-0.578	0.564 ^b	1 (-2.25, 3)	-1 (-2, 1)	-1.296	0.195 ^b
STT-A	0 (-9.5, 12)	1 (-14, 21)	-0.261	0.794 ^b	0 (-12.75, 8)	7.5 (-4.5, 22)	-2.239	0.025 ^b
STT-B	10 (-44, 33)	11 (-13, 48)	-1.235	0.217 ^b	9 (-31.5, 28.5)	5.5 (-25.25, 45.75)	-0.511	0.609 ^b
GDS-15	0 (-1, 1.5)	1 (-1, 2)	-1.025	0.306 ^b	-1 (-2, 1)	-1 (-2, 1)	-0.699	0.484 ^b
SAS	-1.25 (-4.25, 3.13)	1.25 (-3.75, 7.5)	-1.271	0.204 ^b	0 (-4.06, 3.75)	1.25 (-7.19, 7.5)	-1.036	0.300 ^b
UCLA loneliness scale	-2 (-9, 1.5)	0 (-7, 6)	-1.421	0.155 ^b	-4.5 (-12, 0.5)	0 (-6, 4.75)	-2.377	0.017 ^b
QoL-AD	3.89 ± 5.67	0.86 ± 6.28	2.251	0.027 ^a	0.7 ± 7.03	5.15 ± 6.12	-3.112	0.003 ^a
ADL	0 (0, 1)	0 (0, 1)	-0.699	0.485 ^b	0 (0, 1)	0 (0, 1)	-0.193	0.847 ^b
BBS	0 (-1.5, 1)	0 (-2, 1)	-0.343	0.732 ^b	0 (-2, 0)	-1 (-2, 0)	-0.868	0.385 ^b
HPLP-II	10.78 ± 33.22	10.58 ± 29.54	0.029	0.977 ^a	17.5 ± 25.96	22.28 ± 29.86	-0.793	0.430 ^a
SARHP	6 (-15, 17)	0 (-19, 11)	-1.380	0.168 ^b	4 (-10, 24.25)	-1 (-21.75, 12.75)	-1.394	0.163 ^b

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P_{25}, P_{75}).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Table 15. Between-Group Comparisons of Outcome Changes by Hyperlipidemia Subgroup

Variables	No				Yes			
	Intervention group (n=64)	Control group (n=70)	t/Z	P	Intervention group (n=19)	Control group (n=13)	t/Z	P
MoCA	0.16 ± 3.02	-0.49 ± 3.08	1.216	0.226 ^a	0.89 ± 2.47	-1.46 ± 2.37	2.695	0.011 ^a
AVLT-short delayed recall	0.39 ± 5.31	-0.39 ± 4.43	0.922	0.358 ^a	1.32 ± 5.12	0.08 ± 5.89	0.632	0.532 ^a
AVLT-long delayed recall	0.03 ± 3.2	-0.74 ± 2.3	1.619	0.108 ^a	-0.26 ± 1.73	-0.85 ± 2.73	0.741	0.465 ^a
AVLT-recognition recall	0 (-1, 1)	0 (-1, 1.25)	-0.248	0.804 ^b	0 (-2, 0)	-1 (-2.5, 2.5)	0.000	1.000 ^b
ROCFT-immediate recall	0.05 ± 7.49	-2.71 ± 8.19	2.030	0.044 ^a	1.37 ± 9.67	-2.54 ± 8.34	1.184	0.246 ^a
ROCFT-long delayed recall	0.13 ± 7.98	-3.34 ± 8.05	2.502	0.014 ^a	1.16 ± 7.16	-1.77 ± 8.94	1.027	0.313 ^a
ROCFT-copy time	5 (-57, 80.25)	21 (-18.75, 70)	-0.927	0.354 ^b	0 (-105, 100)	-2 (-97.5, 68.5)	-0.211	0.833 ^b
VFT	0.25 ± 3.64	-0.1 ± 3.38	0.577	0.565 ^a	0 ± 4.4	-1.23 ± 4.36	0.780	0.441 ^a
BNT	1 (-2.75, 3)	0 (-2, 2)	-0.904	0.366 ^b	1 (-2, 4)	-1 (-3.5, 3)	-0.674	0.500 ^b
STT-A	0 (-10, 11)	5 (-10.25, 20.25)	-1.114	0.265 ^b	-2 (-14, 7)	9 (-4.5, 25)	-1.728	0.084 ^b
STT-B	7 (-35.75, 29.5)	11 (-15.5, 48.75)	-1.613	0.107 ^b	10 (-43, 38)	-1 (-45.5, 44)	-0.403	0.687 ^b
GDS-15	0 (-1.75, 1)	0 (-1, 1)	-0.716	0.474 ^b	-1 (-4, 1)	0 (-1.5, 2)	-1.657	0.098 ^b
SAS	0 (-3.44, 3.75)	1.88 (-5, 7.5)	-1.113	0.266 ^b	-2.5 (-7.5, 3.75)	1.25 (-1.88, 6.25)	-1.384	0.166 ^b
UCLA loneliness scale	-3.5 (-10, 0)	0.5 (-6, 7)	-3.032	0.002 ^b	0 (-11, 6)	0 (-9, 5)	-0.096	0.923 ^b
QoL-AD	2.42 ± 6.93	3.23 ± 6.73	-0.683	0.496 ^a	1.11 ± 5.48	1.31 ± 5.25	-0.104	0.918 ^a
ADL	0 (0, 1)	0 (0, 1)	-0.226	0.821 ^b	0 (0, 1)	1 (0, 1)	-0.063	0.950 ^b
BBS	0 (-1.75, 0)	-0.5 (-2, 0)	-0.914	0.361 ^b	0 (-3, 0)	1 (-2, 2)	-1.655	0.098 ^b
HPLP-II	14.77 ± 29.45	17.76 ± 30	-0.582	0.562 ^a	13.63 ± 30.14	7.92 ± 30.45	0.524	0.604 ^a
SARHP	4 (-13.75, 21.75)	0 (-19.5, 15.25)	-1.094	0.274 ^b	9 (-9, 33)	-4 (-18, 2)	-2.073	0.038 ^b

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P_{25}, P_{75}).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Table 16. Between-Group Comparisons of Outcome Changes by Chronic Heart Disease Subgroup

Variables	No				Yes			
	Intervention group (n=64)	Control group (n=70)	t/Z	P	Intervention group (n=19)	Control group (n=13)	t/Z	P
MoCA	0.38 ± 2.95	-0.89 ± 2.94	2.528	0.013 ^a	0.07 ± 2.81	0.69 ± 2.98	-0.557	0.583 ^a
AVLT-short delayed recall	0.48 ± 5.4	-0.56 ± 4.77	1.198	0.233 ^a	1.21 ± 4.56	1 ± 3.85	0.131	0.897 ^a
AVLT-long delayed recall	0.1 ± 2.99	-0.73 ± 2.3	1.839	0.068 ^a	-0.71 ± 2.55	-0.92 ± 2.75	0.204	0.840 ^a
AVLT-recognition recall	0 (-2, 1)	0 (-1, 1)	-0.175	0.861 ^b	0.5 (-1, 1.25)	1 (-1, 4.5)	-0.515	0.606 ^b
ROCFT-immediate recall	0.45 ± 8.23	-3.44 ± 7.61	2.896	0.004 ^a	-0.14 ± 6.98	1.38 ± 10.07	-0.461	0.649 ^a
ROCFT-long delayed recall	0.72 ± 7.29	-3.8 ± 7.85	3.521	<0.001 ^a	-1.43 ± 9.93	0.69 ± 9.06	-0.578	0.568 ^a
ROCFT-copy time	1 (-71.5, 71.5)	21 (-18.75, 70.25)	-1.281	0.200 ^b	14.5 (-33.25, 101.75)	-1 (-63.5, 49.5)	-1.068	0.286 ^b
VFT	0.59 ± 3.58	-0.09 ± 3.51	1.130	0.261 ^a	-1.79 ± 4.35	-1.31 ± 3.66	-0.308	0.761 ^a
BNT	1 (-2, 3)	0 (-2, 2)	-1.316	0.188 ^b	0.5 (-2.25, 3)	-1 (-2.5, 2.5)	-0.073	0.942 ^b
STT-A	0 (-11, 9)	6 (-10.25, 20.25)	-1.671	0.095 ^b	0.5 (-8.5, 18.25)	1 (-5.5, 25)	-0.657	0.511 ^b
STT-B	10 (-37.5, 30.5)	7.5 (-20.25, 46.5)	-0.935	0.350 ^b	7 (-57.25, 36.5)	23 (-15.5, 48.5)	-0.971	0.332 ^b
GDS-15	-1 (-2, 1)	0 (-1.25, 1.25)	-1.105	0.269 ^b	0 (-1.25, 1)	1 (-0.5, 1.5)	-1.061	0.289 ^b
SAS	0 (-3.75, 3.75)	0.63 (-5, 6.56)	-0.787	0.431 ^b	-0.88 (-11.88, 3.44)	7.5 (1.25, 9.38)	-2.068	0.039 ^b
UCLA loneliness scale	-2 (-9, 0)	0 (-6.25, 6)	-2.138	0.033 ^b	-5.5 (-16.5, 3.75)	3 (-1, 6.5)	-1.457	0.145 ^b
QoL-AD	2 ± 6.67	3.11 ± 6.55	-0.993	0.322 ^a	2.71 ± 6.52	1.92 ± 6.6	0.313	0.757 ^a
ADL	0 (0, 1)	0 (0, 1)	-0.075	0.941 ^b	0 (0, 1)	0 (0, 1)	-0.557	0.578 ^b
BBS	0 (-2, 0)	-1 (-2, 0)	-0.990	0.322 ^b	-0.5 (-2, 0)	1 (-2, 2)	-1.739	0.082 ^b
HPLP-II	15.46 ± 30.78	17.4 ± 28.85	-0.383	0.703 ^a	9.79 ± 21.87	9.85 ± 36.75	-0.005	0.996 ^a
SARHP	6 (-13.5, 24)	1 (-17.25, 15.25)	-1.201	0.230 ^b	4 (-7.25, 24.25)	-15 (-34.5, -0.5)	-2.233	0.026 ^b

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P_{25} , P_{75}).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Table 17. Between-Group Comparisons of Outcome Changes by Thyroid Diseases Subgroup

Variables	No				Yes			
	Intervention group (n=79)	Control group (n=75)	t/Z	P	Intervention group (n=4)	Control group (n=8)	t/Z	P
MoCA	0.28 ± 2.86	-0.51 ± 2.97	1.673	0.096 ^a	1.25 ± 4.27	-1.88 ± 3.04	1.475	0.171 ^a
AVLT-short delayed recall	0.73 ± 4.98	-0.19 ± 4.67	1.182	0.239 ^a	-2 ± 9.97	-1.5 ± 4.57	-0.123	0.905 ^a
AVLT-long delayed recall	0.04 ± 2.9	-0.67 ± 2.33	1.659	0.099 ^a	-1.5 ± 3.42	-1.63 ± 2.62	0.071	0.945 ^a
AVLT-recognition recall	0 (-1, 1)	0 (-1, 2)	-0.265	0.791 ^b	-2 (-4.5, 2)	0.5 (-0.75, 1)	-1.120	0.263 ^b
ROCFT-immediate recall	0.27 ± 8.16	-2.27 ± 8.27	1.912	0.058 ^a	2 ± 3.56	-6.63 ± 6.16	2.555	0.029 ^a
ROCFT-long delayed recall	0.41 ± 7.81	-2.68 ± 8.11	2.406	0.017 ^a	-0.5 ± 7.94	-7 ± 8.09	1.320	0.216 ^a
ROCFT-copy time	6 (-57, 85)	21 (-35, 70)	-0.600	0.548 ^b	-63 (-190.75, 16)	3.5 (-36.25, 25.75)	-1.019	0.308 ^b
VFT	0.25 ± 3.86	0.05 ± 3.33	0.343	0.732 ^a	-1 ± 2.16	-3.38 ± 4.17	1.052	0.317 ^a
BNT	1 (-2, 3)	0 (-2, 2)	-0.902	0.367 ^b	0.5 (-4.25, 4.5)	-2 (-2.75, -0.25)	-0.693	0.488 ^b
STT-A	0 (-10, 11)	4 (-10, 21)	-0.942	0.346 ^b	-17.5 (-33, -8.75)	20 (3.75, 25)	-2.646	0.008 ^b
STT-B	8 (-38, 31)	8 (-21, 48)	-1.148	0.251 ^b	14 (-34.25, 26.25)	27 (-16.5, 52.5)	-0.510	0.610 ^b
GDS-15	0 (-2, 1)	0 (-1, 2)	-1.306	0.192 ^b	-1 (-3.25, -0.25)	-0.5 (-1.75, 1)	-0.869	0.385 ^b
SAS	0 (-3.75, 3.75)	1.25 (-5, 7.5)	-1.435	0.151 ^b	0 (-9.06, 3.44)	0.63 (0, 4.38)	-0.600	0.549 ^b
UCLA loneliness scale	-4 (-11, 2)	0 (-6, 6)	-2.613	0.009 ^b	-0.5 (-3.25, 0)	0 (-10, 6)	-0.346	0.729 ^b
QoL-AD	1.99 ± 6.71	2.69 ± 6.51	-0.662	0.509 ^a	4.75 ± 4.03	5.13 ± 6.79	-0.100	0.922 ^a
ADL	0 (0, 1)	0 (0, 1)	-0.423	0.673 ^b	0 (0, 0)	0 (0, 1)	-0.816	0.414 ^b
BBS	0 (-2, 0)	0 (-2, 1)	-0.181	0.856 ^b	0 (-2.25, 5.25)	-1 (-3.5, 0)	-0.882	0.378 ^b
HPLP-II	14.66 ± 29.28	15.96 ± 30.42	-0.271	0.787 ^a	11.5 ± 37.01	18.63 ± 28.62	-0.371	0.718 ^a
SARHP	5 (-9, 24)	0 (-19, 12)	-1.965	0.049 ^b	-9.5 (-19, 33.75)	-1 (-18.25, 18)	-0.340	0.734 ^b

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P_{25}, P_{75}).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Table 18. Between-Group Comparisons of Outcome Changes by Suffer from Insomnia Subgroup

Variables	No				Yes			
	Intervention group (n=60)	Control group (n=78)	t/Z	P	Intervention group (n=23)	Control group (n=5)	t/Z	P
MoCA	0.2 ± 3.13	-0.56 ± 2.93	1.474	0.143 ^a	0.65 ± 2.27	-1.8 ± 3.96	1.910	0.067 ^a
AVLT-short delayed recall	0.83 ± 5.12	-0.4 ± 4.71	1.465	0.145 ^a	0 ± 5.66	1 ± 3.67	-0.375	0.710 ^a
AVLT-long delayed recall	-0.02 ± 2.9	-0.82 ± 2.39	1.784	0.077 ^a	-0.09 ± 3.03	0.2 ± 1.64	-0.203	0.840 ^a
AVLT-recognition recall	0 (-2, 1)	0 (-1, 1)	-0.093	0.926 ^b	0 (-1, 1)	2 (0.5, 2.5)	-1.432	0.152 ^b
ROCFT-immediate recall	0.02 ± 8.6	-2.96 ± 8.25	2.064	0.041 ^a	1.22 ± 6.27	1.6 ± 5.46	-0.126	0.901 ^a
ROCFT-long delayed recall	0.2 ± 8.13	-3.46 ± 8.22	2.607	0.010 ^a	0.78 ± 6.88	2.6 ± 4.56	-0.560	0.580 ^a
ROCFT-copy time	0 (-60, 84.5)	20 (-35.5, 70)	-0.685	0.493 ^b	6 (-92, 60)	14 (-39, 61)	-0.210	0.834 ^b
VFT	0.25 ± 3.81	-0.29 ± 3.56	0.864	0.389 ^a	0.04 ± 3.87	0 ± 3.54	0.023	0.982 ^a
BNT	0 (-3, 3)	0 (-2, 2)	-0.069	0.945 ^b	2 (1, 4)	2 (-3.5, 3)	-0.907	0.365 ^b
STT-A	0 (-10, 8)	4.5 (-10, 21.25)	-1.590	0.112 ^b	-1 (-15, 17)	20 (2.5, 31)	-1.290	0.197 ^b
STT-B	10 (-37.75, 30.75)	7.5 (-22.5, 44.25)	-0.752	0.452 ^b	4 (-43, 30)	57 (35.5, 67.5)	-2.429	0.015 ^b
GDS-15	0 (-1, 1)	0 (-1.25, 2)	-0.753	0.452 ^b	-1 (-4, 0)	0 (-1, 1)	-0.977	0.328 ^b
SAS	0 (-3.75, 3.44)	1.25 (-5, 7.5)	-1.035	0.301 ^b	-2.5 (-6.25, 3.75)	8.75 (3.75, 24.38)	-2.407	0.016 ^b
UCLA loneliness scale	-1.5 (-9.75, 2)	0 (-6, 6)	-2.230	0.026 ^b	-4 (-11, 0)	4 (-25.5, 13.5)	-0.391	0.696 ^b
QoL-AD	1.53 ± 7.32	3.22 ± 6.43	-1.437	0.153 ^a	3.65 ± 4.01	-1.6 ± 7.23	2.289	0.030 ^a
ADL	0 (0, 1)	0 (0, 1)	-0.368	0.713 ^b	0 (0, 1)	0 (-0.5, 1)	-0.891	0.373 ^b
BBS	0 (-1.75, 0)	0 (-2, 1)	-0.563	0.574 ^b	-1 (-2, 0)	-1 (-1.5, 0)	-0.094	0.925 ^b
HPLP-II	19.17 ± 30.56	16.56 ± 30.61	0.496	0.621 ^a	2.35 ± 22.56	10.8 ± 22.26	-0.761	0.454 ^a
SARHP	5 (-16.75, 24)	-1 (-21, 12.25)	-1.426	0.154 ^b	5 (-2, 24)	3 (-1, 23.5)	-0.330	0.741 ^b

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P_{25} , P_{75}).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Table 19. Between-Group Comparisons of Outcome Changes by Depression Subgroup

Variables	No				Yes			
	Intervention group (n=64)	Control group (n=64)	t/Z	P	Intervention group (n=19)	Control group (n=19)	t/Z	P
MoCA	0.27 ± 3.11	-0.64 ± 2.92	1.699	0.092 ^a	0.53 ± 2.17	-0.63 ± 3.27	1.286	0.207 ^a
AVLT-short delayed recall	0.53 ± 5.05	-0.31 ± 4.47	1.001	0.319 ^a	0.84 ± 6.03	-0.32 ± 5.35	0.626	0.535 ^a
AVLT-long delayed recall	0.08 ± 2.97	-0.59 ± 2.33	1.424	0.157 ^a	-0.42 ± 2.8	-1.32 ± 2.4	1.058	0.297 ^a
AVLT-recognition recall	0 (-2, 1)	0 (-1, 1.75)	-0.118	0.906 ^b	0 (0, 1)	0 (-1, 2)	-0.208	0.835 ^b
ROCFT-immediate recall	0.06 ± 7.18	-1.89 ± 8.02	1.452	0.149 ^a	1.32 ± 10.48	-5.37 ± 8.29	2.181	0.036 ^a
ROCFT-long delayed recall	0.06 ± 7.67	-2.42 ± 8.07	1.785	0.077 ^a	1.37 ± 8.23	-5.37 ± 8.24	2.522	0.016 ^a
ROCFT-copy time	2.5 (-54, 63)	16.5 (-32.5, 70)	-0.932	0.351 ^b	14 (-94, 100)	23 (-35, 67)	-0.015	0.988 ^b
VFT	0.39 ± 3.93	-0.23 ± 3.2	0.987	0.326 ^a	-0.47 ± 3.34	-0.42 ± 4.62	-0.040	0.968 ^a
BNT	1 (-2, 3)	-0.5 (-2, 2)	-1.075	0.283 ^b	1 (-2, 3)	0 (-2, 3)	-0.484	0.628 ^b
STT-A	0.5 (-10.75, 10)	3.5 (-11, 24.25)	-1.177	0.239 ^b	-1 (-11, 15)	6 (-1, 13)	-1.432	0.152 ^b
STT-B	10 (-29, 34)	9.5 (-20.75, 47.5)	-0.739	0.460 ^b	-16 (-51, 19)	11 (-19, 51)	-1.387	0.165 ^b
GDS-15	0 (-1, 1)	0 (-1, 2)	-0.307	0.759 ^b	-4 (-6, -1)	-1 (-2, 1)	-2.778	0.005 ^b
SAS	0 (-4.5, 3.75)	1.25 (-3.44, 7.5)	-1.456	0.145 ^b	-1.75 (-3.75, 2.5)	2.5 (-10, 8.75)	-0.511	0.609 ^b
UCLA loneliness scale	-1.5 (-8, 2)	0 (-6, 6)	-2.085	0.037 ^b	-7 (-16, 0)	1 (-7, 6)	-1.651	0.099 ^b
QoL-AD	2.61 ± 6.64	2.13 ± 6.53	0.416	0.678 ^a	0.47 ± 6.43	5.63 ± 5.94	-2.568	0.015 ^a
ADL	0 (0, 1)	0 (0, 1)	-0.103	0.918 ^b	0 (0, 1)	0 (0, 1)	-0.447	0.655 ^b
BBS	0 (-2, 0)	0 (-2, 0.75)	-0.182	0.855 ^b	0 (-2, 1)	-1 (-2, 1)	-0.576	0.565 ^b
HPLP-II	14.19 ± 31.07	12.81 ± 29.27	0.258	0.797 ^a	15.58 ± 23.73	27.68 ± 30.78	-1.358	0.183 ^a
SARHP	4.5 (-15.25, 24)	-0.5 (-18, 10)	-1.652	0.099 ^b	7 (-4, 27)	0 (-24, 23)	-0.745	0.456 ^b

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P₂₅, P₇₅).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Table 20. Between-Group Comparisons of Outcome Changes by Family History of Dementia Subgroup

Variables	No				Yes			
	Intervention group (n=76)	Control group (n=69)	t/Z	P	Intervention group (n=7)	Control group (n=14)	t/Z	P
MoCA	0.28 ± 2.85	-0.61 ± 3.13	1.781	0.077 ^a	0.86 ± 3.67	-0.79 ± 2.22	1.284	0.215 ^a
AVLT-short delayed recall	0.68 ± 5.23	-0.49 ± 4.58	1.435	0.153 ^a	-0.29 ± 5.82	0.57 ± 5.08	-0.348	0.732 ^a
AVLT-long delayed recall	0.01 ± 2.91	-0.75 ± 2.33	1.742	0.084 ^a	-0.57 ± 3.26	-0.79 ± 2.58	0.165	0.871 ^a
AVLT-recognition recall	0 (-1, 1)	0 (-1, 1.5)	-0.148	0.882 ^b	0 (-3, 2)	0 (-2, 3.5)	-0.565	0.572 ^b
ROCFT-immediate recall	0.32 ± 7.95	-2.96 ± 7.82	2.495	0.014 ^a	0.71 ± 9.23	-1.36 ± 9.9	0.461	0.650 ^a
ROCFT-long delayed recall	0.57 ± 7.44	-2.86 ± 7.47	2.761	0.007 ^a	-1.86 ± 11.28	-4.29 ± 11.22	0.467	0.646 ^a
ROCFT-copy time	0 (-74.25, 68.25)	14 (-41.5, 67.5)	-0.794	0.427 ^b	83 (42, 124)	33 (0.75, 143.25)	-0.784	0.433 ^b
VFT	-0.12 ± 3.65	-0.36 ± 3.48	0.411	0.682 ^a	3.57 ± 4.04	0.14 ± 3.94	1.866	0.078 ^a
BNT	1 (-1.75, 3)	0 (-2, 2)	-1.598	0.110 ^b	-2 (-3, -2)	-1 (-2.25, 3)	-1.225	0.221 ^b
STT-A	0 (-10, 9.5)	6 (-10, 22)	-1.635	0.102 ^b	1 (-19, 27)	2.5 (-6.25, 21.25)	-0.635	0.525 ^b
STT-B	6 (-38.75, 30)	11 (-20.5, 45.5)	-1.229	0.219 ^b	18 (-15, 61)	15.5 (-13.25, 56.75)	-0.075	0.941 ^b
GDS-15	0 (-1, 1)	0 (-1, 2)	-1.125	0.261 ^b	-2 (-4, -1)	-0.5 (-2, 1)	-1.697	0.090 ^b
SAS	0 (-3.5, 3.75)	1.25 (-5, 7.5)	-1.731	0.084 ^b	-5 (-11.25, 11.25)	0.63 (-9.06, 5.94)	-0.374	0.709 ^b
UCLA loneliness scale	-2.5 (-10.75, 0)	0 (-6.5, 6)	-2.523	0.012 ^b	-8 (-9, 3)	1 (-6, 7.75)	-0.823	0.411 ^b
QoL-AD	2.26 ± 6.86	2.22 ± 6.51	0.041	0.967 ^a	0.57 ± 2.57	6.43 ± 5.61	-2.602	0.017 ^a
ADL	0 (0, 1)	0 (0, 1)	-0.109	0.913 ^a	0 (0, 1)	0 (0, 1)	-0.650	0.516 ^b
BBS	0 (-2, 0)	-1 (-2, 1)	-0.635	0.525 ^a	-1 (-2, 1)	0 (-0.5, 1.5)	-1.000	0.318 ^b
HPLP-II	16.07 ± 28.33	16.17 ± 31.09	-0.022	0.983 ^a	-2.43 ± 37.87	16.43 ± 25.67	-1.355	0.191 ^a
SARHP	4 (-13, 21.75)	0 (-16, 11.5)	-1.309	0.191 ^b	25 (1, 31)	-17 (-34.75, 16.75)	-1.791	0.073 ^b

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P_{25} , P_{75}).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Table 21. Between-Group Comparisons of Outcome Changes by History of Falls Subgroup

Variables	No				Yes			
	Intervention group (n=68)	Control group (n=68)	t/Z	P	Intervention group (n=15)	Control group (n=15)	t/Z	P
MoCA	0.31 ± 2.91	-0.78 ± 3.04	2.135	0.035 ^a	0.4 ± 3.02	0 ± 2.75	0.379	0.707 ^a
AVLT-short delayed recall	0.69 ± 5.26	-0.4 ± 4.58	1.286	0.201 ^a	0.2 ± 5.37	0.07 ± 5.09	0.070	0.945 ^a
AVLT-long delayed recall	0 ± 2.88	-0.51 ± 2.32	1.149	0.253 ^a	-0.2 ± 3.21	-1.87 ± 2.26	1.643	0.112 ^a
AVLT-recognition recall	0 (-1, 1)	0 (-1, 2)	-0.522	0.602 ^b	0 (-2, 3)	0 (-2, 0)	-0.802	0.423 ^b
ROCFT-immediate recall	-0.01 ± 8.34	-2.46 ± 8.52	1.688	0.094 ^a	2 ± 6.16	-3.73 ± 6.45	2.488	0.019 ^a
ROCFT-long delayed recall	0.66 ± 7.7	-2.63 ± 8.17	2.419	0.017 ^a	-1 ± 8.18	-5.2 ± 8.02	1.420	0.167 ^a
ROCFT-copy time	2.5 (-60, 80.25)	20 (-35.5, 70)	-0.738	0.461 ^b	13 (-66, 85)	7 (-35, 69)	-0.062	0.950 ^b
VFT	-0.07 ± 3.94	-0.32 ± 3.61	0.386	0.700 ^a	1.4 ± 2.9	-0.07 ± 3.33	1.287	0.208 ^a
BNT	1 (-2, 3)	0 (-2, 2.75)	-0.891	0.373 ^b	0 (-5, 3)	-1 (-4, -1)	-0.648	0.517 ^b
STT-A	-0.5 (-10, 9.5)	4.5 (-10, 20.75)	-1.691	0.091 ^b	1 (-16, 27)	8 (-7, 22)	-0.311	0.756 ^b
STT-B	6.5 (-35.75, 30.75)	11 (-18.5, 47.5)	-1.210	0.226 ^b	10 (-52, 30)	-1 (-35, 49)	-0.539	0.590 ^b
GDS-15	-1 (-2, 1)	0 (-1, 1)	-1.917	0.055 ^b	0 (-1, 1)	-1 (-2, 2)	-0.460	0.646 ^b
SAS	-1.25 (-4.94, 3.75)	1.25 (-5, 7.5)	-1.728	0.084 ^b	0 (-2.5, 2.5)	0 (-8.75, 5)	-0.208	0.835 ^b
UCLA loneliness scale	-5 (-11, 0)	0 (-6, 6)	-2.920	0.003 ^b	0 (-3, 3)	1 (-7, 5)	-0.083	0.934 ^b
QoL-AD	1.49 ± 6.8	2.75 ± 6.61	-1.100	0.273 ^a	5 ± 4.88	3.73 ± 6.34	0.613	0.545 ^a
ADL	0 (0, 1)	0 (0, 1)	-0.069	0.945 ^b	0 (0, 1)	0 (0, 1)	-0.891	0.373 ^b
BBS	0 (-1.75, 0)	0 (-2, 0.75)	-0.670	0.503 ^b	-1 (-2, 0)	0 (-2, 2)	-0.925	0.355 ^b
HPLP-II	15.5 ± 28.15	13.93 ± 28.08	0.326	0.745 ^a	10 ± 35.38	26.6 ± 37.28	-1.251	0.221 ^a
SARHP	7.5 (-4.75, 24.75)	0 (-18, 11.75)	-2.573	0.010 ^b	-16 (-28, 4)	-11 (-30, 19)	-0.519	0.604 ^b

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P_{25}, P_{75}).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

IV. MCI subtypes

Table 22. Between-Group Comparisons of Outcome Changes by MCI subtypes

Variables	Non-amnestic MCI				Amnestic MCI			
	Intervention group (n = 72)	Control group (n = 68)	t/Z	P	Intervention group (n = 11)	Control group (n = 15)	t/Z	P
MoCA	0.49 ± 2.85	-0.69 ± 2.9	2.420	0.017 ^a	-0.73 ± 3.2	-0.4 ± 3.44	-0.247	0.807 ^a
AVLT-short delayed recall	0.32 ± 5.3	-0.76 ± 4.09	1.350	0.179 ^a	2.45 ± 4.76	1.73 ± 6.41	0.314	0.756 ^a
AVLT-long delayed recall	-0.38 ± 2.88	-1.29 ± 2.19	2.120	0.036 ^a	2.18 ± 2.23	1.67 ± 1.4	0.725	0.476 ^a
AVLT-recognition recall	0 (-1.75, 1)	0 (-1, 1)	-0.032	0.975 ^b	1 (0, 3)	0 (-1, 4)	-0.288	0.773 ^b
ROCFT-immediate recall	0.67 ± 8.2	-3.59 ± 7.83	3.138	0.002 ^a	-1.73 ± 6.48	1.4 ± 8.68	-1.005	0.325 ^a
ROCFT-long delayed recall	0.76 ± 7.91	-4.38 ± 7.64	3.912	<0.001 ^a	-2.27 ± 6.47	2.73 ± 8.11	-1.688	0.104 ^a
ROCFT-copy time	9.5 (-57, 84.5)	23.5 (-20.5, 70)	-0.678	0.498 ^b	-25 (-121, 23)	-7 (-65, 21)	-0.753	0.452 ^b
VFT	0.15 ± 3.57	-0.31 ± 3.64	0.757	0.451 ^a	0.45 ± 5.26	-0.13 ± 3.16	0.356	0.725 ^a
BNT	1 (-2, 3)	-1 (-2, 2)	-1.667	0.095 ^b	0 (-3, 4)	1 (0, 3)	-0.653	0.514 ^b
STT-A	0 (-11, 10)	6 (-8, 20.75)	-2.029	0.042 ^b	1 (-9, 27)	-1 (-14, 32)	-0.208	0.835 ^b
STT-B	6 (-42, 29.5)	11 (-15, 48)	-1.851	0.064 ^b	13 (-22, 38)	-12 (-49, 40)	-0.779	0.436 ^b
GDS-15	0 (-1, 1)	0 (-1, 2)	-1.141	0.254 ^b	-1 (-4, 0)	0 (-2, 1)	-1.155	0.248 ^b
SAS	0 (-2.69, 3.75)	2.5 (-3.44, 7.5)	-1.637	0.102 ^b	-3.75 (-11, -1.25)	-1.25 (-5, 5)	-0.652	0.515 ^b
UCLA loneliness scale	-2.5 (-10.75, 0)	0 (-7, 6)	-2.021	0.043 ^b	-4 (-8, 3)	3 (-3, 6)	-1.925	0.054 ^b
QoL-AD	1.94 ± 6.88	2.82 ± 6.53	-0.774	0.440 ^a	3.27 ± 4.54	3.4 ± 6.77	-0.054	0.957 ^a
ADL	0 (0, 1)	0 (0, 1)	-0.526	0.599 ^b	0 (0, 1)	0 (0, 1)	-0.342	0.733 ^b
BBS	0 (-1.75, 0)	0 (-2, 0)	-0.618	0.537 ^b	-1 (-3, 0)	0 (-2, 2)	-0.576	0.564 ^b
HPLP-II	14.11 ± 29.88	16.09 ± 28.77	-0.398	0.691 ^a	17.09 ± 27.46	16.8 ± 36.65	0.022	0.983 ^a
SARHP	5 (-7.75, 23.5)	0 (-16.75, 11)	-1.737	0.082 ^b	0 (-20, 42)	-7 (-51, 29)	-1.064	0.287 ^b

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P₂₅, P₇₅).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Appendix 6. Subgroup Analysis of Intervention Effects Based on Adherence Levels

Table 1 Comparison of Intervention Effects by Overall Adherence Levels Subgroup

Variables	Low-adherence group (n = 19)	High-adherence group (n = 64)	t/Z	P	d/r
MoCA	0.16 ± 3.69	0.38 ± 2.67	0.284	0.777 ^a	0.074
AVLT-short delayed recall	1 ± 5.5	0.48 ± 5.22	-0.374	0.710 ^a	0.098
AVLT-long delayed recall	-0.16 ± 3.25	0 ± 2.84	0.206	0.837 ^a	0.054
AVLT-recognition recall	-1 (-2, 2)	0 (-1, 1)	-1.482	0.138 ^b	0.222
ROCFT-immediate recall	-1.79 ± 6.85	0.98 ± 8.25	1.334	0.186 ^a	0.348
ROCFT-long delayed recall	-0.26 ± 6.09	0.55 ± 8.23	0.397	0.692 ^a	0.104
ROCFT-copy time	6 (-32, 72)	2.5 (-86.75, 89.75)	-0.271	0.786 ^b	0.041
VFT	0.58 ± 3.61	0.08 ± 3.88	-0.502	0.617 ^a	0.131
BNT	1 (-3, 3)	1 (-2, 3)	-0.495	0.621 ^b	0.075
STT-A	-1 (-10, 8)	0 (-11, 11.75)	-0.428	0.668 ^b	0.065
STT-B	10 (-29, 35)	6(-42, 29.5)	-0.618	0.537 ^b	0.094
GDS-15	0 (-1, 2)	-1 (-2, 1)	-1.532	0.126 ^b	0.229
SAS	0 (-2.5, 3.75)	-0.88 (-4.5, 3.75)	-0.402	0.688 ^b	0.061
UCLA loneliness scale	-5 (-16, 3)	-2.5 (-9.75, 0)	-0.500	0.617 ^b	0.076
QoL-AD	2.68 ± 8.37	1.95 ± 6.07	-0.421	0.675 ^a	0.110
ADL	0 (0, 0)	0 (0, 1)	-1.007	0.314 ^b	0.131
BBS	0 (-2, 0)	0 (-2, 0)	-0.130	0.896 ^b	0.019
HPLP-II	21.95 ± 39.25	12.3 ± 25.79	-1.260	0.211 ^a	0.329
SARHP	6 (-6, 30)	4.5 (-13, 24)	-0.461	0.645 ^b	0.070

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P₂₅, P₇₅).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Table 2. Between-Group Comparisons of Outcome Changes by Daily Health Lifestyle Record Subgroup

Variables	Low-participation group (n=18)	High-participation group (n=65)	t/Z	P	d/r
MoCA	0.44 ± 2.97	0.29 ± 2.91	0.195	0.846 ^a	0.052
AVLT-short delayed recall	-1.22 ± 5.81	1.11 ± 5.02	-1.684	0.096 ^a	0.449
AVLT-long delayed recall	-1.39 ± 2.89	0.34 ± 2.84	-2.277	0.025 ^a	0.607
AVLT-recognition recall	0.5 (-1, 2)	-2 (0, 0)	-1.046	0.295 ^b	0.160
ROCFT-immediate recall	1.06 ± 9.3	0.15 ± 7.67	0.421	0.675 ^a	0.112
ROCFT-long delayed recall	0.83 ± 7.49	0.23 ± 7.9	0.290	0.773 ^a	0.077
ROCFT-copy time	-10.5 (-72.5, 49.5)	-59 (0, 13)	-0.840	0.401 ^b	0.130
VFT	0.83 ± 3.13	0.02 ± 3.97	0.806	0.423 ^a	0.215
BNT	0.5 (-2.25, 2.25)	-2 (0, 1)	-0.577	0.564 ^b	0.089
STT-A	-0.5 (-7.75, 12.25)	-11.5 (0, 0)	-0.862	0.389 ^b	0.133
STT-B	14.5 (-6.25, 38.25)	-43.5 (0, -1)	-1.387	0.165 ^b	0.215
GDS-15	-1 (-4.25, 0.25)	-1 (0, 0)	-1.533	0.125 ^b	0.234
SAS	-0.88 (-5.31, 2.5)	-3.75 (0, 0)	-0.487	0.626 ^b	0.075
UCLA loneliness scale	-7.5 (-16, 5.25)	-8.5 (0, -2)	-0.703	0.482 ^b	0.109
QoL-AD	3.22 ± 6.96	1.82 ± 6.54	0.797	0.428 ^a	0.212
ADL	0 (0, 0)	0 (0, 0)	-1.227	0.220 ^b	0.162
BBS	0 (-1.25, 0.25)	-2 (0, 0)	-0.491	0.623 ^b	0.073
HPLP-II	12.22 ± 33.37	15.14 ± 28.49	-0.370	0.712 ^a	0.099
SRAHP	9 (-4, 20.5)	-13.5 (0, 4)	-0.442	0.658 ^b	0.068

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P_{25} , P_{75}).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Table 3. Between-Group Comparisons of Outcome Measures by Health Education Subgroup

Variables	Low-participation group (n=24)	High-participation group (n=59)	t/Z	P	d/r
MoCA	-0.21±2.77	0.54±2.96	-1.067	0.289 ^a	0.258
AVLT-short delayed recall	0.25±5.29	0.75±5.28	-0.388	0.699 ^a	0.094
AVLT-long delayed recall	-0.46±2.48	0.14±3.08	-0.839	0.404 ^a	0.203
AVLT-recognition recall	0 (-2, 1)	0 (-1, 1)	-0.661	0.509 ^b	0.092
ROCFT-immediate recall	-2.00±6.40	1.31±8.43	-1.727	0.088 ^a	0.418
ROCFT-long delayed recall	0.33±6.89	0.37±8.15	-0.021	0.983 ^a	0.005
ROCFT-copy time	-40 (-88.25, 8.25)	23 (-41, 92)	-2.165	0.030 ^b	0.304
VFT	0.04±2.80	0.25±4.16	-0.230	0.819 ^a	0.056
BNT	0.5 (-2.75, 2)	1 (-2, 3)	-1.079	0.281 ^b	0.151
STT-A	0.5 (-5, 6.75)	-2 (-12, 11)	-0.734	0.463 ^b	0.103
STT-B	10.5 (-26.5, 38)	8 (-39, 24)	-0.980	0.327 ^b	0.138
GDS-15	-1 (-2, 1)	0 (-1, 1)	-0.438	0.662 ^b	0.061
SAS	-0.63 (-3.75, 4.69)	0 (-5, 3.75)	-0.423	0.673 ^b	0.059
UCLA loneliness scale	-7.5 (-16, -1)	-1 (-10, 2)	-1.833	0.067 ^b	0.257
QoL-AD	2.46±7.83	1.98±6.12	0.295	0.769 ^a	0.071
ADL	0 (0, 0)	0 (0, 1)	-2.219	0.027 ^b	0.267
BBS	0 (0, 0)	0 (-2, 0)	-1.696	0.090 ^b	0.228
HPLP-II	13.33±27.89	14.98±30.25	-0.230	0.818 ^a	0.056
SARHP	6 (-5.5, 23.25)	4 (-16, 24)	-0.462	0.644 ^b	0.065

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P_{25} , P_{75}).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Table 4. Between-Group Comparisons of Outcome Changes by Cognitive Stimulation Subgroup

Variables	Low-participation group (n=33)	High-participation group (n=50)	t/Z	P	d/r
MoCA	0.18 ± 2.59	0.42 ± 3.12	-0.363	0.718 ^a	0.081
AVLT-short delayed recall	0.15 ± 5.54	0.9 ± 5.09	-0.633	0.528 ^a	0.142
AVLT-long delayed recall	-0.21 ± 2.97	0.08 ± 2.91	-0.444	0.658 ^a	0.100
AVLT-recognition recall	0 (-1.5, 1)	0 (-1.25, 1)	-0.612	0.540 ^b	0.079
ROCFT-immediate recall	-1.45 ± 8.09	1.54 ± 7.79	-1.688	0.095 ^a	0.379
ROCFT-long delayed recall	0.15 ± 6.38	0.5 ± 8.62	-0.199	0.843 ^a	0.045
ROCFT-copy time	-8 (-59, 38.5)	19 (-72, 98.5)	-1.173	0.241 ^b	0.153
VFT	0.24 ± 3.74	0.16 ± 3.88	0.096	0.924 ^a	0.022
BNT	0 (-2, 2)	1 (-2.25, 4)	-1.009	0.313 ^b	0.131
STT-A	1 (-7.5, 10.5)	-2 (-14.25, 10.25)	-1.233	0.217 ^b	0.161
STT-B	10 (-20.5, 36.5)	3.5 (-43.25, 25)	-1.08	0.280 ^b	0.141
GDS-15	-1 (-2, 0.5)	0 (-1.25, 1)	-0.655	0.512 ^b	0.084
SAS	-1.25 (-4.25, 3.75)	0 (-4.06, 3.75)	-0.242	0.808 ^b	0.032
UCLA loneliness scale	-6 (-16, -0.5)	-0.5 (-8.25, 2.25)	-1.922	0.055 ^b	0.250
QoL-AD	1.39 ± 7.57	2.6 ± 5.94	-0.811	0.420 ^a	0.182
ADL	0 (0, 0)	0 (0, 1)	-2.860	0.004 ^b	0.319
BBS	0 (-0.5, 0)	0 (-3, 0)	-1.946	0.052 ^b	0.242
HPLP-II	17.42 ± 29.06	12.58 ± 29.8	0.732	0.466 ^a	0.164
SARHP	7 (-6.5, 27)	3.5 (-13.75, 24)	-0.740	0.459 ^b	0.096

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P₂₅, P₇₅).

a denotes two-sample independent t-test, b denotes Mann-Whitney U test.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Table 5. Between-Group Comparisons of Outcome Measures by Cognitive Rehabilitation Subgroup

Variables	Less than 60 minutes (n = 22)	60-120 minutes (n = 10)	Greater than 120 minutes (n = 51)	F/H	P	η^2/ϵ^2
MoCA	0.09 ± 3.35	-0.8 ± 1.62	0.65 ± 2.88	1.135	0.327 ^a	0.028
AVLT-short delayed recall	0.23 ± 5.45	0.3 ± 4.32	0.82 ± 5.41	0.115	0.891 ^a	0.003
AVLT-long delayed recall	-1 ± 3.27	0.5 ± 2.88	0.27 ± 2.73	1.684	0.192 ^a	0.040
AVLT-recognition recall	-1 (-2, 0.25)	1.5 (0.75, 3) ^c	0 (-1, 1) ^d	8.557	0.014 ^b	0.104
ROCFT-immediate recall	-1.73 ± 6.44	-2.4 ± 8.72	1.78 ± 8.27	2.216	0.116 ^a	0.053
ROCFT-long delayed recall	-0.18 ± 5.72	-2.9 ± 7.45	1.24 ± 8.5	1.266	0.287 ^a	0.031
ROCFT-copy time	11.5 (-61.25, 86.25)	27.5 (-52.5, 99.75)	0 (-90, 71)	0.993	0.609 ^b	0.012
VFT	0.68 ± 3.51	0.1 ± 4.25	0 ± 3.89	0.246	0.783 ^a	0.006
BNT	0.5 (-3.25, 3)	2 (-3.25, 4.5)	1 (-2, 3)	1.395	0.498 ^b	0.017
STT-A	-0.5 (-10.25, 8)	16.5 (7.75, 31.25) ^c	-5 (-15, 6) ^d	14.48	< 0.001 ^b	0.177
STT-B	10 (-29.75, 33)	1.5 (-66.25, 41.25)	4 (-38, 30)	0.609	0.738 ^b	0.007
GDS-15	0 (-2, 1.25)	-1 (-5, -0.25)	0 (-1, 1)	2.623	0.269 ^b	0.032
SAS	0 (-3.13, 4.06)	-0.88 (-8.44, 1.25)	0 (-3.75, 3.75)	0.933	0.627 ^b	0.011
UCLA loneliness scale	-4.5 (-16, 3)	0 (-6.5, 4)	-4 (-10, 0)	2.122	0.346 ^b	0.026
QoL-AD	0.95 ± 7.84	2.8 ± 5.25	2.49 ± 6.34	0.468	0.628 ^a	0.012
ADL	0 (0, 0.25)	0.5 (0, 1.25)	0 (0, 1)	1.766	0.414 ^b	0.022
BBS	0 (-2, 0)	0 (-1, 1)	0 (-2, 0)	1.037	0.595 ^b	0.013
HPLP-II	19.55 ± 40.29	7.3 ± 30.26	13.75 ± 23.48	0.634	0.533 ^a	0.016
SARHP	7.5 (-8, 30.25)	-10.5 (-23.25, 10.75)	5 (-8, 24)	3.683	0.159 ^b	0.045

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P₂₅, P₇₅).

a denotes One-way ANOVA, b denotes Kruskal-Wallis H test, c represents differences with less than 60 minutes, d represents differences with 60-120 minutes.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.

Table 6. Between-Group Comparisons of Outcome Measures by Cognitive Training Subgroups

Variables	Less than 60 minutes (n = 27)	60-120 minutes (n = 11)	Greater than 120 minutes (n = 45)	F/H	P	η^2/ϵ^2
MoCA	-0.26 ± 3.29	0.18 ± 2.86	0.71 ± 2.68	0.953	0.390 ^a	0.023
AVLT-short delayed recall	-0.07 ± 5.55	2.45 ± 4.87	0.56 ± 5.17	0.908	0.408 ^a	0.022
AVLT-long delayed recall	-0.7 ± 3.34	0.27 ± 2.41	0.29 ± 2.75	1.048	0.356 ^a	0.026
AVLT-recognition recall	0 (-2, 2)	1 (-2, 2)	0 (-1, 1)	1.478	0.478 ^b	0.018
ROCFT-immediate recall	-1.63 ± 6.75	1.45 ± 10.78	1.27 ± 7.89	1.234	0.297 ^a	0.030
ROCFT-long delayed recall	-0.37 ± 6.23	-1.55 ± 7.54	1.27 ± 8.63	0.752	0.475 ^a	0.018
ROCFT-copy time	6 (-57, 90)	0 (-48, 44)	10 (-91.5, 77)	0.225	0.893 ^b	0.003
VFT	0.22 ± 3.51	0.64 ± 3.44	0.07 ± 4.11	0.098	0.907 ^a	0.002
BNT	0 (-4, 3)	2 (-1, 4)	1 (-2, 3)	1.945	0.378 ^b	0.024
STT-A	4 (-10, 10)	7 (-6, 17)	-2 (-13, 6)	3.049	0.218 ^b	0.037
STT-B	10 (-45, 39)	15 (-11, 38)	3 (-41, 18)	2.001	0.368 ^b	0.024
GDS-15	-1 (-2, 1)	-1 (-4, 0)	0 (-1, 1)	1.583	0.453 ^b	0.019
SAS	0 (-5, 3.75)	-1.25 (-3.75, 1.25)	-1.25 (-4.25, 4.13)	0.264	0.876 ^b	0.003
UCLA loneliness scale	-1 (-16, 5)	-6 (-8, 0)	-3 (-9.5, 0)	0.017	0.992 ^b	0.000
QoL-AD	1.63 ± 7.36	4.45 ± 4.3	1.84 ± 6.61	0.795	0.455 ^a	0.019
ADL	0 (0, 0)	1 (0, 2)	0 (0, 1)	3.822	0.148 ^b	0.047
BBS	0 (-2, 1)	0 (-1, 0)	0 (-2, 0)	0.936	0.626 ^b	0.011
HPLP-II	18.22 ± 36.05	5.55 ± 36.82	14.47 ± 22.56	0.720	0.490 ^a	0.018
SARHP	6 (-9, 21)	3 (-20, 13)	5 (-10.5, 24.5)	0.536	0.765 ^b	0.007

Note: Data in each group are expressed as change from baseline to post-intervention and presented as Mean ± SD or median (P₂₅, P₇₅).

a denotes One-way ANOVA, b denotes Kruskal-Wallis H test, c represents differences with less than 60 minutes, d represents differences with 60-120 minutes.

Abbreviations: ADL, Activities of Daily Living; AVLT, Auditory Verbal Learning Test; BBS, Berg Balance Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale; HPLP-II, Health-Promoting Lifestyle Profile II; MoCA, Montreal Cognitive Assessment; QoL-AD, Quality of Life-Alzheimer's Disease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale; VFT, Verbal Fluency Test.ease; ROCFT, Rey-Osterrieth Complex Figure Test; SAS, Self-Rating Anxiety Scale; SRAHP, Self-Rated Abilities for Health Practices; STT, Shape Trail Test; UCLA loneliness scale, University of California, Los Angeles Loneliness Scale.