

The intervention effect of Panbrain EC2 on brain aging, memory, and attention

1. Introduction

Brain aging has always been the focus of research in the field of cognitive neuroscience, and the performance of memory and attention can reflect the degree of brain aging to a certain extent, among which memory is particularly critical. As we age, the function of brain neurons degenerates and neural network connections weaken, leading to a decrease in memory storage and retrieval efficiency and a decrease in the ability to maintain attention.^[1] Neuroimaging studies have found that memory-related brain areas such as the hippocampus and prefrontal cortex in the elderly shrink in size and functional connectivity, which are related to decline in cognitive performance.^[2] These changes are considered important markers of brain aging and are often assessed through standardized cognitive tests. Thus, the decline in memory and concentration is not only a natural manifestation of the aging process, but also provides reliable indicators for studying and intervening in brain aging.

Similarly, memory and attention are also hot research topics that have attracted considerable interest. Memory can be defined as the brain's key ability to store, maintain and reproduce the content and experiences mapped by important objective facts in the past. It is the basis for the accumulation and application of human knowledge. Attention refers to the ability of an individual to actively mobilize and maintain focus on a specific task or piece of information over a period of time. It is crucial for individuals to efficiently complete various cognitive tasks.

In view of the importance of memory in assessing the degree of brain aging and concentration in daily life, study and work, scientific researchers have been committed to exploring reliable technologies to improve these two core cognitive abilities. Current research shows that transcranial direct current stimulation (tDCS) can meet this need.^[3] This study was conducted based on the Panbrain EC2 (Shenzhen Panbrain Technology Co., Ltd., using tDCS technology), aiming to evaluate the intervention effect of this device in improving brain aging and improving memory and

attention.

2. Experimental method

2.1. General information

This study recruits social groups. After screening, 200 subjects are finally included and divided into stimulation group and control group using random grouping method, with 100 subjects in each group. There were no significant differences in basic characteristics such as age and gender between the two groups of subjects. See Table 1.

Inclusion criteria: (1) Self-reported memory and attention problems in daily life; (2) No current or past mental illness; (3) Age ≥ 18 years old; (4) Voluntary participation in the trial and signed informed consent.

Exclusion criteria: (1) Suffering from epilepsy or other systemic organic diseases; (2) Sensitive to electrical stimulation; (3) Skin lesions or skull defects at the stimulation site; (4) Metal implants in the skull, electronic devices implanted in the body, etc.

Exit criteria: (1) Subjects show discomfort to tDCS treatment during the trial; (2) Subjects withdraw from the trial due to personal factors.

Table 1 Comparison of the general information of the two groups of subjects

Group	n	Age (years, $\bar{x} \pm s$)	Gender (n)	
			M	F
Stimulation	100	30.72 $\pm$ 8.47	56	44
Control	100	30.02 $\pm$ 6.79	48	52
t/χ^2		0.645	1.282	
P		0.520	0.258	

2.2. Intervention

The stimulation group used the Panbrain EC2 for tDCS treatment. Using the 10-20 international standard system positioning, the anode electrode was placed on

the left dorsolateral prefrontal cortex (i.e., area F3), and the cathode electrode was placed on the right dorsolateral prefrontal cortex (i.e., area F4). Before placing the electrode, use 0.9% sodium chloride solution to soak the electrode sleeve to enhance the electrode conductivity. Each treatment lasted 15 minutes, once a day, 5 days a week, for 4 consecutive weeks (20 sessions).

The operation of the control group was the same as that of the stimulation group, but no current stimulation was applied during the treatment process.

2.3. Evaluation indicators

Before the start of treatment and after the 4-week treatment, the Wechsler Memory Scale-IV edition (WMS-IV) and n-back task were used to evaluate the subject's memory, and the Adult ADHD Self-Report Scale (ASRS) and Attentional Control Scale (ACS) were used to assess the subject's attention.

2.3.1. Memory assessment index

WMS-IV is a set of tests to evaluate various memory functions and working memory, which can provide corresponding information for clinical diagnosis and rehabilitation evaluation.^[4] WMS-IV includes 6 basic subscales, namely brief cognition, logical memory, word pairing, graphic reset, visual reproduction, and spatial superposition, which can be converted into 5 index scores: auditory memory, visual memory, visual working memory, immediate memory, and delayed memory. The total score of all subscales is synthesized into the Full Scale Memory Quotient (FSMQ).^[5] Among them, FSMQ scores of 90 to 109 belong to moderate memory ability, 110 to 119 points to above average memory, 120 to 129 points to extraordinary memory ability, 130 points and above to extremely extraordinary memory ability, 80 to 89 points to below average memory, 70 to 79 points to marginal memory, and 69 points or below to memory deficit.^[6]

Use the visual 2-back task to assess working memory.^[7] During the test, the patient needs to compare the number currently seen with the number that appeared twice before. If the two numbers are the same, click "1", if they are different, click "2". The number displayed in each test appears randomly from 0 to 9, and there are 30

numbers in each round of testing. The number of correct judgments is the test score, with a full score of 30 points. The higher the score, the better the working memory.

After the assessment is completed, convert the FSMQ score and n-back score into a hundred-point system. Finally, the composite score is calculated based on the weight of FSMQ score accounting for 60% and n-back score accounting for 40%. The specific calculation method is as follows:

$$\text{Memory Score} = \frac{\text{FSMQ}}{145} \times 100 \times 60\% + \frac{\text{n-back}}{30} \times 100 \times 40\%$$

Since FSMQ is a standardized score with a mean of 100 and a standard deviation of 15, and the theoretical maximum value is determined by the standardized norm and is not a fixed value, this study regarded 145 (3 standard deviations above the mean) as the maximum value of FSMQ when converting to a percentage system.

2.3.2. Attention assessment index

The ASRS was developed to screen adults for Attention Deficit Hyperactivity Disorder,^[8] but most of the symptoms it assesses are related to attention deficits, so it is also suitable for assessing individual attention performance. ASRS includes 18 items, each item is scored from 0 to 4 points, and the total score is from 0 to 72 points. The higher the score, the more serious the attention deficit is.

ACS is widely used to measure an individual's attention control ability, involving two dimensions: attention focusing and attention shifting.^[9] The scale contains 20 questions. In this test, each question is scored from 0 to 3 points. Some of the questions are reverse scored, with a total score of 0 to 60 points. The ACSR score is obtained by negatively transforming the ACS score. The higher the ACSR, the weaker the individual's attention control ability.

$$\text{ACSR} = 60 - \text{ACS}$$

After the evaluation is completed, convert the ASRS score and the transformed ACSR score into a hundred-point system. Finally, the composite score is calculated based on the weight of each of the two scores accounting for 50%. The specific

calculation method is as follows:

$$\text{Attention Score} = \frac{\text{ASRS}}{72} \times 100 \times 50\% + \frac{\text{ACSR}}{60} \times 100 \times 50\%$$

2.3.3. Brain aging assessment indicators

The performance of memory and attention can reflect the degree of brain aging to a certain extent, because with age, the functional degradation of brain neurons and weakening of neural network connections may lead to a decrease in memory storage and retrieval efficiency and a decrease in attention maintenance ability. These changes are often regarded as important indicators for assessing cognitive aging.

After the memory and attention assessments are completed, the brain aging score is calculated by weighting the memory score 70% and the attention score 30% to calculate the composite score. Since the meaning of the attention score is that the higher the score, the more serious the attention deficit is, so the attention score is negatively transformed before calculation:

$$\text{Negative Attention Score} = 100 - \text{Attention Score}$$

The specific calculation method of the brain aging score is as follows:

$$\text{Brain Aging Score} = \text{Memory Score} \times 70\% + \text{Negative Attention Score} \times 30\%$$

2.4. Statistical method

SPSS 27.0 software is used to analyze the data. Categorical data are expressed as counts (n) and χ^2 tested; Continuous data are expressed as mean $\pm$ standard deviation ($\bar{x} \pm s$). The differences within the group before and after the intervention are using paired t test, and the differences between groups are using unpaired t test. $P < 0.05$ indicates significant differences and is statistically significant.

3. Results

3.1. Comparison of memory scores before and after treatment

Before treatment, there was no significant difference in the FSMQ scores, n-back scores and memory composite scores of the two groups of subjects ($P \geq 0.05$). After 4

Table 2 Comparison of FSMQ scores of two groups of subjects before and after treatment ($\bar{x} \pm s$)

Group	Before	After	<i>t</i>	<i>P</i>
Stimulation	85.51±8.46	105.23±8.56 ^{ab}	18.458	<0.001
Control	85.07±8.80	86.29±7.98	1.166	0.247
<i>t</i>	0.360	16.184		
<i>P</i>	0.719	<0.001		

Note: Compared with before treatment, ^a*P*<0.05; Compared with the control group, ^b*P*<0.05;

Table 3 Comparison of n-back scores of two groups of subjects before and after treatment ($\bar{x} \pm s$)

Group	Before	After	<i>t</i>	<i>P</i>
Stimulation	18.16±2.89	22.36±3.03 ^{ab}	12.740	<0.001
Control	17.78±3.19	18.98±2.98	2.920	0.004
<i>t</i>	0.882	7.951		
<i>P</i>	0.379	0.040		

Note: compared with before treatment, ^a*P*<0.05; compared with the control group, ^b*P*<0.05;

Table 4 Comparison of comprehensive memory scores of the two groups of subjects before and after treatment ($\bar{x} \pm s$)

Group	Before	After	<i>t</i>	<i>P</i>
Stimulation	59.60±6.64	73.36±6.94 ^{ab}	17.131	<0.001
Control	58.91±6.99	61.01±6.23	2.442	0.016
<i>t</i>	0.714	13.244		
<i>P</i>	0.476	<0.001		

Note: compared with before treatment, ^a*P*<0.05; compared with the control group, ^b*P*<0.05;

weeks of treatment, the above scores of the stimulation group were significantly improved compared with before treatment (*P*<0.05), while the n-back score and memory composite score of the control group were also improved (*P*<0.05), but the FSMQ score did not change significantly (*P*≥0.05). Comparison between groups

showed that the improvement in the stimulation group was significantly better than that in the control group, and the difference was statistically significant ($P<0.05$). See Table 2-4.

3.2. Comparison of attention scores before and after treatment

Before treatment, there was no significant difference in the ASRS, ACSR and attention composite scores of the two groups of subjects ($P\geq 0.05$), indicating that the baseline levels were equivalent. After 4 weeks of treatment, the above-mentioned scores of the subjects in both groups were significantly lower than before treatment ($P<0.05$). The comparison results between groups showed that the improvement of various scores in the stimulation group was significantly better than that in the control group, and the difference was statistically significant ($P<0.05$). See Tables 5-7.

Table 5 Comparison of ASRS scores of two groups of subjects before and after treatment ($\bar{x} \pm s$)

Group	Before	After	<i>t</i>	<i>P</i>
Stimulation	18.33±4.78	11.36±3.72 ^{ab}	-14.521	<0.001
Control	17.82±5.16	16.77±5.96	2.873	0.005
<i>t</i>	0.724	-7.697		
<i>P</i>	0.470	<0.001		

Note: Compared with before treatment, ^a $P<0.05$; Compared with the control group, ^b $P<0.05$;

Table 6 Comparison of ACSR scores of two groups of subjects before and after treatment ($\bar{x} \pm s$)

Group	Before	After	<i>t</i>	<i>P</i>
Stimulation	46.49±7.61	28.77±8.80 ^{ab}	-18.626	<0.001
Control	44.90±9.72	42.41±12.11	-3.116	0.002
<i>t</i>	1.288	-9.113		
<i>P</i>	0.199	<0.001		

Note: compared with before treatment, ^a $P<0.05$; compared with the control group, ^b $P<0.05$;

Table 7 Comparison of composite attention scores of the two groups of subjects before and after treatment ($\bar{x} \pm s$)

Group	Before	After	<i>t</i>	<i>P</i>
Stimulation	51.47±9.54	31.86±9.88 ^{ab}	-17.801	<0.001
Control	49.79±11.52	46.99±14.07	-3.123	0.002
<i>t</i>	1.123	-8.796		
<i>P</i>	0.263	<0.001		

Note: compared with before treatment, ^a*P*<0.05; compared with the control group ^b*P*<0.05;

3.3. Comparison of brain aging composite scores before and after treatment

Before treatment, there was no significant difference in the brain aging composite scores of the two groups of subjects (*P*≥0.05). After 4 weeks of treatment, the scores of the subjects in both groups were significantly improved compared with before treatment (*P*<0.05). The comparison results between groups showed that the stimulation group's score improvement was significantly better than that of the control group, and the difference was statistically significant (*P*<0.05). See Table 8.

Table 8 Comparison of brain aging composite scores of two groups of subjects before and after treatment ($\bar{x} \pm s$)

Group	Before	After	<i>t</i>	<i>P</i>
Stimulation	56.28±7.51	71.79±5.34 ^{ab}	24.101	<0.001
Control	56.30±5.91	58.61±6.20 ^a	3.353	0.001
<i>t</i>	0.027	16.100		
<i>P</i>	0.979	<0.001		

Note: compared with before treatment, ^a*P*<0.05; compared with the control group, ^b*P*<0.05;

4. Conclusion

This study shows through a randomized controlled trial that the Panbrain EC2 using tDCS technology can significantly improve an individual's memory and concentration after four weeks (20 sessions) of intervention. In terms of memory, the

FSMQ score of the stimulation group increased by 23.06% ($P<0.05$) with a responder rate of 88.00%; the n-back score increased by 23.13% ($P<0.05$) with a responder rate of 87.00%; the composite score increased by 23.09% ($P<0.05$) with a responder rate of 89.00%. In contrast, the FSMQ score of the control group only increased by 1.43% ($P=0.247$) with a responder rate of 56.00%; the n-back score increased by 6.75% ($P<0.05$) with a responder rate of 59.00%; the composite score increased by 3.57% ($P<0.05$) with a responder rate of 56.00%. The stimulation group's improvement in various indicators was significantly better than that of the control group, and the difference was statistically significant ($P<0.05$).

Regarding attention, the ASRS score of the stimulation group decreased by 38.03% ($P<0.05$) with a responder rate of 86.00%; the ACSR score decreased by 38.12% ($P<0.05$) with a responder rate of 91.00%; the composite score decreased by 38.09% ($P<0.05$) with a responder rate of 89.00%. In the control group, the ASRS score only decreased by 5.89% ($P<0.05$) with a responder rate of 59.00%. The ACSR score decreased by 13.97% ($P<0.05$) with a responder rate of 61.00%. The composite score decreased by 6.24% ($P<0.05$) with a responder rate of 64.00%. The comparison between groups showed that the stimulation group was significantly better than the control group in improving concentration, and the difference was statistically significant ($P<0.05$).

In terms of brain aging, the brain aging composite score of the stimulation group improved by 27.57% ($P<0.05$) with a responder rate of 97.00%, while the brain aging composite score of the control group only improved by 4.11% ($P<0.05$) with a responder rate of 66.00%. The comparison between groups showed that the stimulation group was significantly better than the control group in improving brain aging, and the difference was statistically significant ($P<0.05$).

In summary, this study shows that as a non-invasive neuromodulation device, Panbrain EC2 can provide a safe and feasible intervention option for effectively improving individual memory, attention and improving brain aging.

References

- [1] Eyler, L. T. , Sherzai, A. , Kaup, A. R. , & Jeste, D. V. . (2011). A review of functional brain imaging correlates of successful cognitive aging. *Biological Psychiatry*, 70(2), 115-122.
- [2] Bishop, N. A. , Lu, T. , & Yankner, B. A. . (2010). Neural mechanisms of aging and cognitive decline. *Nature*, 464(7288), 529-535.
- [3] Guo Dalong, Ge Hua, Zhang Ying, et al. The stimulated brain-enhancing effect of transcranial direct current stimulation technology on cognitive function [J]. *Military Medicine*, 2018, 42(3): 234-237.
- [4] Wang Jian, Zou Yizhuang, Cui Jiefeng, et al. Revision of the fourth Chinese version of the Wechsler Memory Scale (adult version) [J]. *Chinese Journal of Mental Health*, 2015, 29(1): 53-59.
- [5] Wang Haiyan, Zhao Weiliang, Ma Linshan. Correlation analysis affecting Wechsler Memory Scale scores in patients with schizophrenia [J]. *Chinese Journal of Health Care Medicine*, 2020, 22(1): 45-48.
- [6] Neuropsychology and Behavioral Neurology Group, Branch of Neurology, Chinese Medical Association, Wang Jian, Chen Haibo. Expert consensus on the clinical application of commonly used neuropsychological cognitive assessment scales [J]. *Chinese Journal of Neurology*, 2019, 52(3): 166-176.
- [7] Zhou Wenxin, Wang Shiyan, Gu Chengchen, et al. The improvement effect of cognitive training and simultaneous transcranial direct current stimulation treatment on working memory in patients with post-stroke cognitive impairment [J]. *Neurological Diseases and Mental Health*, 2024, 24(02): 88-93.
- [8] KESSLER R C, ADLER L, AMES M, et al. The World Health Organization Adult ADHD Self-Report Scale (ASRS): a short screening scale for use in the general population[J]. *Psychol Med*, 2005,35(2): 245-256.
- [9] ÓLAFSSON R P, SMÁRI J, GUÐMUNDSDÓTTIR F, et al. Self reported attentional control with the Attentional Control Scale: factor structure and relationship with symptoms of anxiety and depression[J]. *J Anxiety Disord*, 2011,25(6): 777-782.

Appendix A

Table A.1 General information and memory scores of the two groups of subjects

Group	Subject	Gender	Age	Before treatment			After treatment		
				FSMQ	n-back	Composite score	FSMQ	n-back	Composite score
Stimulation group (1~100)	1	Female	34	81	17	56.18	107	21	72.28
	2	Male	25	82	17	56.60	109	22	74.44
	3	Male	31	89	16	58.16	114	20	73.84
	4	Male	42	76	12	47.45	94	16	60.23
	5	Male	31	96	21	67.72	116	25	81.33
	6	Male	20	103	22	71.95	123	26	85.56
	7	Female	21	95	17	61.98	113	24	78.76
	8	Male	28	82	15	53.93	99	17	63.63
	9	Female	28	90	17	59.91	87	16	57.33
	10	Male	21	84	14	53.43	106	20	70.53
	11	Male	32	105	22	72.78	123	27	86.90
	12	Female	43	95	18	63.31	95	17	61.98
	13	Male	27	93	20	65.15	111	20	72.60
	14	Male	28	78	18	56.28	96	19	65.06
	15	Female	19	88	16	57.75	114	23	77.84
	16	Female	22	79	13	50.02	101	19	67.13
	17	Male	18	82	16	55.26	109	22	74.44
	18	Female	26	79	14	51.36	97	19	65.47
	19	Male	35	74	11	45.29	98	18	64.55
	20	Female	45	75	14	49.70	101	23	72.46
	21	Male	48	83	19	59.68	110	21	73.52
	22	Female	29	77	11	46.53	99	17	63.63
	23	Male	27	91	20	64.32	121	23	80.74
	24	Female	38	84	15	54.76	108	22	74.02
	25	Female	35	92	14	56.74	90	14	55.91

Continued Table A.1 General information and memory scores of the two groups of subjects

Group	Subject	Gender	Age	Before treatment			After treatment		
				FSMQ	n-back	Composite score	FSMQ	n-back	Composite score
Stimulation group (1~100)	26	Female	34	89	18	60.83	115	26	82.25
	27	Female	35	100	19	66.71	95	20	65.98
	28	Male	31	73	17	52.87	96	23	70.39
	29	Female	32	91	22	66.99	110	25	78.85
	30	Female	25	87	18	60.00	105	20	70.11
	31	Female	37	73	15	50.21	94	23	69.56
	32	Male	23	80	19	58.44	99	25	74.30
	33	Male	23	87	17	58.67	111	22	75.26
	34	Female	37	97	25	73.47	96	23	70.39
	35	Male	45	101	24	73.79	109	24	77.10
	36	Male	27	73	17	52.87	99	22	70.30
	37	Female	26	96	21	67.72	115	28	84.92
	38	Female	34	90	17	59.91	103	22	71.95
	39	Male	40	84	18	58.76	108	22	74.02
	40	Male	39	90	21	65.24	90	20	63.91
	41	Male	33	82	20	60.60	98	25	73.89
	42	Female	25	83	17	57.01	100	20	68.05
	43	Male	36	97	23	70.80	110	24	77.52
	44	Female	29	96	21	67.72	109	23	75.77
	45	Male	42	96	18	63.72	116	27	84.00
	46	Female	18	90	19	62.57	112	26	81.01
	47	Female	31	74	14	49.29	110	25	78.85
	48	Male	42	90	17	59.91	110	22	74.85
	49	Male	26	98	20	67.22	97	23	70.80
	50	Female	25	88	18	60.41	109	19	70.44

Continued Table A.1 General information and memory scores of the two groups of subjects

Group	Subject	Gender	Age	Before treatment			After treatment		
				FSMQ	n-back	Composite score	FSMQ	n-back	Composite score
Stimulation group (1~100)	51	Female	22	93	24	70.48	120	27	85.66
	52	Female	28	90	21	65.24	96	22	69.06
	53	Female	28	82	21	61.93	109	24	77.10
	54	Male	31	87	17	58.67	99	21	68.97
	55	Female	22	77	16	53.20	100	23	72.05
	56	Male	31	92	19	63.40	107	20	70.94
	57	Male	25	74	15	50.62	103	22	71.95
	58	Male	27	75	17	53.70	104	25	76.37
	59	Male	23	77	19	57.20	110	25	78.85
	60	Male	28	63	14	44.74	110	23	76.18
	61	Male	62	96	20	66.39	104	25	76.37
	62	Female	60	87	19	61.33	109	23	75.77
	63	Male	40	78	16	53.61	103	24	74.62
	64	Female	37	96	24	71.72	108	25	78.02
	65	Male	19	70	13	46.30	110	27	81.52
	66	Male	25	83	19	59.68	116	24	80.00
	67	Male	25	82	17	56.60	108	23	75.36
	68	Female	35	87	16	57.33	110	26	80.18
	69	Female	34	87	21	64.00	107	19	69.61
	70	Female	31	77	17	54.53	109	25	78.44
	71	Female	27	84	22	64.09	107	24	76.28
	72	Male	22	83	17	57.01	101	21	69.79
	73	Female	30	89	19	62.16	88	18	60.41
	74	Male	40	93	21	66.48	116	27	84.00
	75	Male	34	94	20	65.56	119	28	86.57

Continued Table A.1 General information and memory scores of the two groups of subjects

Group	Subject	Gender	Age	Before treatment			After treatment		
				FSMQ	n-back	Composite score	FSMQ	n-back	Composite score
Stimulation group (1~100)	76	Female	32	77	18	55.86	105	23	74.11
	77	Female	36	85	19	60.51	109	22	74.44
	78	Male	35	74	19	55.95	107	24	76.28
	79	Female	18	75	15	51.03	109	21	73.10
	80	Male	30	84	19	60.09	107	24	76.28
	81	Male	26	97	18	64.14	121	27	86.07
	82	Male	18	78	18	56.28	107	24	76.28
	83	Male	18	87	18	60.00	110	26	80.18
	84	Female	27	82	21	61.93	105	19	68.78
	85	Male	37	94	17	61.56	87	18	60.00
	86	Male	28	75	20	57.70	94	22	68.23
	87	Female	32	84	16	56.09	105	22	72.78
	88	Male	22	89	20	63.49	112	27	82.34
	89	Female	19	94	19	64.23	109	24	77.10
	90	Male	31	97	23	70.80	93	21	66.48
	91	Male	22	85	18	59.17	109	20	71.77
	92	Male	40	71	15	49.38	97	17	62.80
	93	Female	45	78	17	54.94	109	26	79.77
	94	Female	27	75	19	56.37	109	20	71.77
	95	Male	41	94	22	68.23	112	25	79.68
	96	Male	39	79	20	59.36	93	20	65.15
	97	Male	18	91	18	61.66	82	20	60.60
	98	Female	30	82	20	60.60	109	25	78.44
	99	Male	32	92	23	68.74	87	18	60.00
	100	Male	35	78	16	53.61	106	20	70.53

Continued Table A.1 General information and memory scores of the two groups of subjects

Group	Subject	Gender	Age	Before treatment			After treatment		
				FSMQ	n-back	Composite score	FSMQ	n-back	Composite score
Control group (101~200)	101	Male	25	88	22	65.75	86	21	63.59
	102	Female	21	90	16	58.57	94	17	61.56
	103	Female	37	79	12	48.69	88	14	55.08
	104	Female	23	74	12	46.62	84	15	54.76
	105	Male	35	80	14	51.77	77	13	49.20
	106	Female	40	86	23	66.25	91	24	69.66
	107	Female	28	97	23	70.80	92	22	67.40
	108	Female	33	82	22	63.26	85	23	65.84
	109	Male	36	98	17	63.22	91	15	57.66
	110	Female	29	90	16	58.57	82	13	51.26
	111	Female	35	97	24	72.14	87	17	58.67
	112	Male	19	86	15	55.59	70	11	43.63
	113	Male	41	78	13	49.61	89	22	66.16
	114	Male	20	69	11	43.22	76	19	56.78
	115	Male	18	87	15	56.00	82	15	53.93
	116	Female	44	94	17	61.56	94	22	68.23
	117	Male	29	82	14	52.60	91	18	61.66
	118	Female	34	79	15	52.69	74	16	51.95
	119	Male	26	82	21	61.93	89	17	59.49
	120	Male	20	73	15	50.21	77	18	55.86
	121	Female	19	92	17	60.74	101	23	72.46
	122	Female	36	83	17	57.01	85	22	64.51
	123	Male	27	95	18	63.31	102	19	67.54
	124	Female	28	84	16	56.09	81	15	53.52
	125	Male	34	91	19	62.99	91	22	66.99

Continued Table A.1 General information and memory scores of the two groups of subjects

Group	Subject	Gender	Age	Before treatment			After treatment		
				FSMQ	n-back	Composite score	FSMQ	n-back	Composite score
Control group (101~200)	126	Male	29	74	17	53.29	90	17	59.91
	127	Female	30	74	17	53.29	97	24	72.14
	128	Female	19	90	22	66.57	87	21	64.00
	129	Female	28	85	18	59.17	86	20	62.25
	130	Male	36	84	15	54.76	100	20	68.05
	131	Female	26	98	23	71.22	82	15	53.93
	132	Male	34	89	17	59.49	86	16	56.92
	133	Male	38	88	17	59.08	94	24	70.90
	134	Male	38	100	26	76.05	88	21	64.41
	135	Female	36	79	15	52.69	97	18	64.14
	136	Female	19	92	22	67.40	95	21	67.31
	137	Female	26	93	23	69.15	89	21	64.83
	138	Male	37	84	18	58.76	80	15	53.10
	139	Female	33	88	18	60.41	91	24	69.66
	140	Female	30	76	19	56.78	75	15	51.03
	141	Female	33	76	15	51.45	88	17	59.08
	142	Male	39	87	16	57.33	93	18	62.48
	143	Female	31	92	20	64.74	88	21	64.41
	144	Male	24	108	21	72.69	93	19	63.82
	145	Male	29	80	14	51.77	102	23	72.87
	146	Male	28	88	23	67.08	94	18	62.90
	147	Male	37	85	16	56.51	88	18	60.41
	148	Female	33	70	18	52.97	91	21	65.66
	149	Female	34	82	15	53.93	90	18	61.24
	150	Male	31	71	16	50.71	76	18	55.45

Continued Table A.1 General information and memory scores of the two groups of subjects

Group	Subject	Gender	Age	Before treatment			After treatment		
				FSMQ	n-back	Composite score	FSMQ	n-back	Composite score
Control group (101~200)	151	Female	27	93	24	70.48	83	21	62.34
	152	Male	30	79	19	58.02	96	22	69.06
	153	Female	32	87	16	57.33	86	16	56.92
	154	Female	19	81	20	60.18	91	19	62.99
	155	Male	31	89	16	58.16	78	20	58.94
	156	Female	37	81	21	61.52	87	16	57.33
	157	Male	29	90	17	59.91	91	18	61.66
	158	Male	42	92	23	68.74	76	14	50.11
	159	Female	34	101	19	67.13	89	22	66.16
	160	Female	27	84	17	57.43	85	19	60.51
	161	Female	29	68	19	53.47	79	16	54.02
	162	Male	28	79	16	54.02	86	22	64.92
	163	Male	32	98	17	63.22	71	18	53.38
	164	Male	36	77	18	55.86	70	20	55.63
	165	Male	28	94	18	62.90	77	16	53.20
	166	Male	33	87	19	61.33	79	18	56.69
	167	Male	43	98	17	63.22	77	22	61.20
	168	Female	37	69	20	55.22	73	15	50.21
	169	Male	36	84	20	61.43	89	16	58.16
	170	Male	24	76	16	52.78	74	20	57.29
	171	Female	26	109	26	79.77	87	19	61.33
	172	Male	32	93	18	62.48	93	18	62.48
	173	Female	29	98	24	72.55	86	16	56.92
	174	Female	18	77	14	50.53	87	23	66.67
	175	Female	18	82	15	53.93	83	21	62.34

Continued Table A.1 General information and memory scores of the two groups of subjects

Group	Subject	Gender	Age	Before treatment			After treatment		
				FSMQ	n-back	Composite score	FSMQ	n-back	Composite score
Control group (101~200)	176	Female	38	84	20	61.43	75	21	59.03
	177	Female	24	96	18	63.72	86	18	59.59
	178	Male	46	84	22	64.09	94	24	70.90
	179	Male	19	92	17	60.74	100	20	68.05
	180	Male	33	69	15	48.55	83	20	61.01
	181	Male	30	83	19	59.68	74	19	55.95
	182	Male	24	79	17	55.36	88	23	67.08
	183	Male	33	73	14	48.87	89	23	67.49
	184	Male	24	90	16	58.57	85	21	63.17
	185	Female	37	89	16	58.16	77	18	55.86
	186	Female	31	86	17	58.25	102	23	72.87
	187	Female	19	75	13	48.37	68	16	49.47
	188	Male	19	96	21	67.72	82	17	56.60
	189	Female	28	89	16	58.16	76	15	51.45
	190	Female	39	84	17	57.43	81	17	56.18
	191	Female	31	86	17	58.25	89	23	67.49
	192	Female	30	84	18	58.76	87	18	60.00
	193	Female	35	71	15	49.38	81	17	56.18
	194	Female	19	84	17	57.43	92	21	66.07
	195	Female	41	79	16	54.02	91	21	65.66
	196	Male	23	78	14	50.94	91	24	69.66
	197	Female	30	76	18	55.45	83	21	62.34
	198	Female	27	82	16	55.26	95	18	63.31
	199	Male	31	69	13	45.89	82	18	57.93
	200	Male	19	94	22	68.23	106	19	69.20

Table A.2 General information and attention scores of the two groups of subjects

Group	Subject	Gender	Age	Before treatment				After treatment			
				ASRS	ACS	ACSR	Composite score	ASRS	ACS	ACSR	Composite score
Stimulation group (1~100)	1	Female	34	17	14	46	50.14	8	37	23	24.72
	2	Male	25	29	3	57	67.64	13	27	33	36.53
	3	Male	31	20	10	50	55.56	11	33	27	30.14
	4	Male	42	24	7	53	60.83	15	19	41	44.58
	5	Male	31	13	21	39	41.53	5	48	12	13.47
	6	Male	20	20	8	52	57.22	10	33	27	29.44
	7	Female	21	27	0	60	68.75	21	11	49	55.42
	8	Male	28	10	30	30	31.94	6	45	15	16.67
	9	Female	28	22	6	54	60.28	11	30	30	32.64
	10	Male	21	19	11	49	54.03	11	33	27	30.14
	11	Male	32	13	22	38	40.69	8	40	20	22.22
	12	Female	43	20	9	51	56.39	9	38	22	24.58
	13	Male	27	13	21	39	41.53	8	40	20	22.22
	14	Male	28	16	18	42	46.11	7	39	21	22.36
	15	Female	19	11	27	33	35.14	13	29	31	34.86
	16	Female	22	13	21	39	41.53	8	39	21	23.06
	17	Male	18	12	23	37	39.17	8	36	24	25.56
	18	Female	26	20	10	50	55.56	12	28	32	35.00
	19	Male	35	24	6	54	61.67	11	31	29	31.81
	20	Female	45	15	18	42	45.42	17	19	41	45.97
	21	Male	48	21	10	50	56.25	14	25	35	38.89
	22	Female	29	21	9	51	57.08	21	12	48	54.58
	23	Male	27	20	11	49	54.72	12	27	33	35.83
	24	Female	38	21	9	51	57.08	15	21	39	42.92
	25	Female	35	17	13	47	50.97	10	34	26	28.61

Continued Table A.2 General information and attention scores of the two groups of subjects

Group	Subject	Gender	Age	Before treatment				After treatment			
				ASRS	ACS	ACSR	Composite score	ASRS	ACS	ACSR	Composite score
stimulation group (1~100)	26	Female	34	26	3	57	65.56	15	21	39	42.92
	27	Female	35	29	1	59	69.31	17	19	41	45.97
	28	Male	31	19	10	50	54.86	13	28	32	35.69
	29	Female	32	13	23	37	39.86	16	21	39	43.61
	30	Female	25	24	6	54	61.67	11	32	28	30.97
	31	Female	37	15	20	40	43.75	5	48	12	13.47
	32	Male	23	16	19	41	45.28	19	15	45	50.69
	33	Male	23	23	8	52	59.31	14	27	33	37.22
	34	Female	37	11	25	35	36.81	9	37	23	25.42
	35	Male	45	11	27	33	35.14	16	20	40	44.44
	36	Male	27	20	6	54	58.89	14	25	35	38.89
	37	Female	26	20	8	52	57.22	13	27	33	36.53
	38	Female	34	19	11	49	54.03	8	40	20	22.22
	39	Male	40	21	3	57	62.08	17	18	42	46.81
	40	Male	39	24	6	54	61.67	16	19	41	45.28
	41	Male	33	23	8	52	59.31	10	31	29	31.11
	42	Female	25	15	19	41	44.58	7	40	20	21.53
	43	Male	36	22	8	52	58.61	14	26	34	38.06
	44	Female	29	19	10	50	54.86	10	33	27	29.44
	45	Male	42	16	18	42	46.11	19	14	46	51.53
	46	Female	18	12	23	37	39.17	16	18	42	46.11
	47	Female	31	22	8	52	58.61	12	29	31	34.17
	48	Male	42	17	15	45	49.31	10	31	29	31.11
	49	Male	26	19	10	50	54.86	12	29	31	34.17
	50	Female	25	14	21	39	42.22	7	41	19	20.69

Continued Table A.2 General information and attention scores of the two groups of subjects

Group	Subject	Gender	Age	Before treatment				After treatment			
				ASRS	ACS	ACSR	Composite score	ASRS	ACS	ACSR	Composite score
Stimulation group (1~100)	51	Female	22	11	31	29	31.81	12	30	30	33.33
	52	Female	28	19	9	51	55.69	9	34	26	27.92
	53	Female	28	18	15	45	50.00	10	33	27	29.44
	54	Male	31	24	6	54	61.67	14	27	33	37.22
	55	Female	22	22	8	52	58.61	14	25	35	38.89
	56	Male	31	24	7	53	60.83	13	27	33	36.53
	57	Male	25	15	20	40	43.75	7	40	20	21.53
	58	Male	27	14	20	40	43.06	8	40	20	22.22
	59	Male	23	12	24	36	38.33	6	43	17	18.33
	60	Male	28	21	9	51	57.08	13	26	34	37.36
	61	Male	62	32	0	60	72.22	15	23	37	41.25
	62	Female	60	22	8	52	58.61	12	30	30	33.33
	63	Male	40	14	20	40	43.06	1	58	2	2.36
	64	Female	37	23	9	51	58.47	13	27	33	36.53
	65	Male	19	13	22	38	40.69	14	26	34	38.06
	66	Male	25	11	26	34	35.97	16	19	41	45.28
	67	Male	25	22	6	54	60.28	11	32	28	30.97
	68	Female	35	14	22	38	41.39	9	35	25	27.08
	69	Female	34	20	9	51	56.39	12	31	29	32.50
	70	Female	31	25	4	56	64.03	12	30	30	33.33
	71	Female	27	20	7	53	58.06	12	31	29	32.50
	72	Male	22	23	8	52	59.31	8	41	19	21.39
	73	Female	30	10	27	33	34.44	12	28	32	35.00
	74	Male	40	22	8	52	58.61	11	33	27	30.14
	75	Male	34	29	4	56	66.81	17	19	41	45.97

Continued Table A.2 General information and attention scores of the two groups of subjects

Group	Subject	Gender	Age	Before treatment				After treatment			
				ASRS	ACS	ACSR	Composite score	ASRS	ACS	ACSR	Composite score
Stimulation group (1~100)	76	Female	32	21	6	54	59.58	14	26	34	38.06
	77	Female	36	11	27	33	35.14	16	23	37	41.94
	78	Male	35	17	14	46	50.14	6	47	13	15.00
	79	Female	18	16	19	41	45.28	9	36	24	26.25
	80	Male	30	20	7	53	58.06	5	47	13	14.31
	81	Male	26	20	9	51	56.39	11	34	26	29.31
	82	Male	18	20	8	52	57.22	13	29	31	34.86
	83	Male	18	17	14	46	50.14	9	37	23	25.42
	84	Female	27	15	18	42	45.42	17	18	42	46.81
	85	Male	37	15	18	42	45.42	7	44	16	18.19
	86	Male	28	23	9	51	58.47	12	29	31	34.17
	87	Female	32	11	30	30	32.64	6	42	18	19.17
	88	Male	22	17	16	44	48.47	12	30	30	33.33
	89	Female	19	20	8	52	57.22	11	29	31	33.47
	90	Male	31	15	19	41	44.58	9	37	23	25.42
	91	Male	22	21	7	53	58.75	11	34	26	29.31
	92	Male	40	18	11	49	53.33	10	35	25	27.78
	93	Female	45	14	20	40	43.06	8	40	20	22.22
	94	Female	27	19	12	48	53.19	8	39	21	23.06
	95	Male	41	17	15	45	49.31	9	38	22	24.58
	96	Male	39	16	15	45	48.61	7	43	17	19.03
	97	Male	18	15	16	44	47.08	11	31	29	31.81
	98	Female	30	19	11	49	54.03	12	28	32	35.00
	99	Male	32	12	29	31	34.17	8	41	19	21.39
	100	Male	35	16	11	49	51.94	10	35	25	27.78

Continued Table A.2 General information and attention scores of the two groups of subjects

Group	Subject	Gender	Age	Before treatment				After treatment			
				ASRS	ACS	ACSR	Composite score	ASRS	ACS	ACSR	Composite score
Control group (101~200)	101	Male	25	10	31	29	31.11	12	28	32	35.00
	102	Female	21	18	14	46	50.83	14	23	37	40.56
	103	Female	37	25	6	54	62.36	20	8	52	57.22
	104	Female	23	30	2	58	69.17	29	5	55	65.97
	105	Male	35	15	22	38	42.08	17	15	45	49.31
	106	Female	40	11	28	32	34.31	15	19	41	44.58
	107	Female	28	19	8	52	56.53	16	17	43	46.94
	108	Female	33	21	10	50	56.25	24	9	51	59.17
	109	Male	36	18	12	48	52.50	16	16	44	47.78
	110	Female	29	12	26	34	36.67	14	22	38	41.39
	111	Female	35	32	3	57	69.72	27	3	57	66.25
	112	Male	19	11	30	30	32.64	17	13	47	50.97
	113	Male	41	16	15	45	48.61	21	3	57	62.08
	114	Male	20	11	31	29	31.81	13	26	34	37.36
	115	Male	18	16	16	44	47.78	22	8	52	58.61
	116	Female	44	20	7	53	58.06	21	7	53	58.75
	117	Male	29	21	8	52	57.92	16	18	42	46.11
	118	Female	34	15	20	40	43.75	13	25	35	38.19
	119	Male	26	22	8	52	58.61	15	19	41	44.58
	120	Male	20	21	10	50	56.25	12	29	31	34.17
	121	Female	19	23	9	51	58.47	27	1	59	67.92
	122	Female	36	17	15	45	49.31	22	2	58	63.61
	123	Male	27	27	0	60	68.75	18	11	49	53.33
	124	Female	28	24	5	55	62.50	24	7	53	60.83
	125	Male	34	26	1	59	67.22	28	3	57	66.94

Continued Table A.2 General information and attention scores of the two groups of subjects

Group	Subject	Gender	Age	Before treatment				After treatment			
				ASRS	ACS	ACSR	Composite score	ASRS	ACS	ACSR	Composite score
Control group (101~200)	126	Male	29	16	15	45	48.61	21	4	56	61.25
	127	Female	30	14	21	39	42.22	12	27	33	35.83
	128	Female	19	22	9	51	57.78	26	5	55	63.89
	129	Female	28	15	19	41	44.58	10	30	30	31.94
	130	Male	36	21	10	50	56.25	17	14	46	50.14
	131	Female	26	23	6	54	60.97	22	6	54	60.28
	132	Male	34	18	14	46	50.83	12	30	30	33.33
	133	Male	38	20	8	52	57.22	17	14	46	50.14
	134	Male	38	22	4	56	61.94	24	6	54	61.67
	135	Female	36	18	14	46	50.83	15	18	42	45.42
	136	Female	19	21	3	57	62.08	26	3	57	65.56
	137	Female	26	12	29	31	34.17	6	43	17	18.33
	138	Male	37	24	5	55	62.50	31	2	58	69.86
	139	Female	33	13	23	37	39.86	12	26	34	36.67
	140	Female	30	11	32	28	30.97	8	40	20	22.22
	141	Female	33	25	5	55	63.19	26	1	59	67.22
	142	Male	39	18	11	49	53.33	16	16	44	47.78
	143	Female	31	21	3	57	62.08	16	15	45	48.61
	144	Male	24	17	14	46	50.14	11	30	30	32.64
	145	Male	29	13	27	33	36.53	17	16	44	48.47
	146	Male	28	11	32	28	30.97	9	34	26	27.92
	147	Male	37	21	7	53	58.75	23	8	52	59.31
	148	Female	33	17	15	45	49.31	13	25	35	38.19
	149	Female	34	17	16	44	48.47	18	12	48	52.50
	150	Male	31	20	11	49	54.72	23	9	51	58.47

Continued Table A.2 General information and attention scores of the two groups of subjects

Group	Subject	Gender	Age	Before treatment				After treatment			
				ASRS	ACS	ACSR	Composite score	ASRS	ACS	ACSR	Composite score
Control group (101~200)	151	Female	27	11	32	28	30.97	8	36	24	25.56
	152	Male	30	15	19	41	44.58	13	27	33	36.53
	153	Female	32	24	0	60	66.67	21	7	53	58.75
	154	Female	19	21	7	53	58.75	20	6	54	58.89
	155	Male	31	12	28	32	35.00	10	31	29	31.11
	156	Female	37	11	30	30	32.64	13	25	35	38.19
	157	Male	29	15	21	39	42.92	8	40	20	22.22
	158	Male	42	19	12	48	53.19	21	4	56	61.25
	159	Female	34	23	8	52	59.31	20	8	52	57.22
	160	Female	27	19	10	50	54.86	18	13	47	51.67
	161	Female	29	13	24	36	39.03	15	22	38	42.08
	162	Male	28	20	5	55	59.72	14	25	35	38.89
	163	Male	32	12	30	30	33.33	7	42	18	19.86
	164	Male	36	14	21	39	42.22	14	23	37	40.56
	165	Male	28	15	19	41	44.58	13	24	36	39.03
	166	Male	33	12	27	33	35.83	13	26	34	37.36
	167	Male	43	17	17	43	47.64	11	31	29	31.81
	168	Female	37	14	24	36	39.72	10	31	29	31.11
	169	Male	36	17	13	47	50.97	21	5	55	60.42
	170	Male	24	16	16	44	47.78	13	25	35	38.19
	171	Female	26	16	16	44	47.78	22	1	59	64.44
	172	Male	32	16	17	43	46.94	15	20	40	43.75
	173	Female	29	24	-3	63	69.17	28	-13	73	80.28
	174	Female	18	21	6	54	59.58	16	18	42	46.11
	175	Female	18	19	12	48	53.19	16	16	44	47.78

Continued Table A.2 General information and attention scores of the two groups of subjects

Group	Subject	Gender	Age	Before treatment				After treatment			
				ASRS	ACS	ACSR	Composite score	ASRS	ACS	ACSR	Composite score
Control group (101~200)	176	Female	38	11	29	31	33.47	9	34	26	27.92
	177	Female	24	10	31	29	31.11	10	30	30	31.94
	178	Male	46	10	32	28	30.28	6	44	16	17.50
	179	Male	19	31	2	58	69.86	31	0	60	71.53
	180	Male	33	23	9	51	58.47	18	13	47	51.67
	181	Male	30	20	8	52	57.22	19	8	52	56.53
	182	Male	24	13	26	34	37.36	11	32	28	30.97
	183	Male	33	13	24	36	39.03	14	21	39	42.22
	184	Male	24	21	6	54	59.58	18	10	50	54.17
	185	Female	37	26	5	55	63.89	27	-11	71	77.92
	186	Female	31	10	33	27	29.44	6	44	16	17.50
	187	Female	19	16	16	44	47.78	11	31	29	31.81
	188	Male	19	18	14	46	50.83	11	29	31	33.47
	189	Female	28	10	30	30	31.94	13	27	33	36.53
	190	Female	39	23	0	60	65.97	21	6	54	59.58
	191	Female	31	16	16	44	47.78	14	20	40	43.06
	192	Female	30	28	4	56	66.11	28	7	53	63.61
	193	Female	35	16	17	43	46.94	15	19	41	44.58
	194	Female	19	20	7	53	58.06	16	19	41	45.28
	195	Female	41	13	24	36	39.03	15	21	39	42.92
	196	Male	23	15	18	42	45.42	13	26	34	37.36
	197	Female	30	12	29	31	34.17	13	24	36	39.03
	198	Female	27	20	6	54	58.89	19	12	48	53.19
	199	Male	31	25	3	57	64.86	20	8	52	57.22
	200	Male	19	15	20	40	43.75	15	21	39	42.92

Table A.3 General information and brain aging scores of the two groups of subjects

Group	Subject	Gender	Age	Before treatment	After treatment
Stimulation group (1~100)	1	Female	34	54.28	73.18
	2	Male	25	49.33	71.15
	3	Male	31	54.04	72.65
	4	Male	42	44.97	58.79
	5	Male	31	64.95	82.89
	6	Male	20	63.20	81.06
	7	Female	21	52.76	68.51
	8	Male	28	58.17	69.54
	9	Female	28	53.85	60.34
	10	Male	21	51.19	70.33
	11	Male	32	68.74	84.16
	12	Female	43	57.40	66.01
	13	Male	27	63.15	74.15
	14	Male	28	55.56	68.83
	15	Female	19	59.88	74.03
	16	Female	22	52.56	70.07
	17	Male	18	56.93	74.44
	18	Female	26	49.28	65.33
	19	Male	35	43.20	65.64
	20	Female	45	51.16	66.93
	21	Male	48	54.90	69.80
	22	Female	29	45.45	58.17
	23	Male	27	58.61	75.77
	24	Female	38	51.21	68.94
	25	Female	35	54.43	60.55
	26	Female	34	52.91	74.70
	27	Female	35	55.90	62.40

Continued Table A.3 General information and brain aging scores of the two groups of subjects

Group	Subject	Gender	Age	Before treatment	After treatment
Stimulation group (1~100)	28	Male	31	50.55	68.57
	29	Female	32	64.94	72.11
	30	Female	25	53.50	69.79
	31	Female	37	52.02	74.65
	32	Male	23	57.32	66.80
	33	Male	23	53.28	71.52
	34	Female	37	70.39	71.65
	35	Male	45	71.11	70.64
	36	Male	27	49.34	67.54
	37	Female	26	60.24	78.49
	38	Female	34	55.73	73.70
	39	Male	40	52.51	67.77
	40	Male	39	57.17	61.15
	41	Male	33	54.63	72.39
	42	Female	25	56.53	71.18
	43	Male	36	61.98	72.85
	44	Female	29	60.95	74.21
	45	Male	42	60.77	73.34
	46	Female	18	62.05	72.87
	47	Female	31	46.92	74.94
	48	Male	42	57.14	73.06
	49	Male	26	60.60	69.31
	50	Female	25	59.62	73.10
	51	Female	22	69.79	79.96
	52	Female	28	58.96	69.97
	53	Female	28	58.35	75.14
	54	Male	31	52.57	67.11

Continued Table A.3 General information and brain aging scores of the two groups of subjects

Group	Subject	Gender	Age	Before treatment	After treatment
Stimulation group (1~100)	55	Female	22	49.66	68.77
	56	Male	31	56.13	68.70
	57	Male	25	52.31	73.91
	58	Male	27	54.67	76.79
	59	Male	23	58.54	79.70
	60	Male	28	44.19	72.12
	61	Male	62	54.81	71.08
	62	Female	60	55.35	73.04
	63	Male	40	54.61	81.53
	64	Female	37	62.66	73.66
	65	Male	19	50.20	75.65
	66	Male	25	60.99	72.42
	67	Male	25	51.54	73.46
	68	Female	35	57.71	78.00
	69	Female	34	57.88	68.98
	70	Female	31	48.96	74.91
	71	Female	27	57.45	73.65
	72	Male	22	52.11	72.44
	73	Female	30	63.18	61.79
	74	Male	40	58.95	79.76
	75	Male	34	55.85	76.81
	76	Female	32	51.23	70.46
	77	Female	36	61.82	69.53
	78	Male	35	54.12	78.90
	79	Female	18	52.14	73.30
	80	Male	30	54.65	79.10
	81	Male	26	57.98	81.46

Continued Table A.3 General information and brain aging scores of the two groups of subjects

Group	Subject	Gender	Age	Before treatment	After treatment
Stimulation group (1~100)	82	Male	18	52.23	72.94
	83	Male	18	56.96	78.50
	84	Female	27	59.73	64.10
	85	Male	37	59.47	66.54
	86	Male	28	52.85	67.51
	87	Female	32	59.47	75.20
	88	Male	22	59.90	77.64
	89	Female	19	57.80	73.93
	90	Male	31	66.19	68.91
	91	Male	22	53.79	71.45
	92	Male	40	48.57	65.63
	93	Female	45	55.54	79.17
	94	Female	27	53.50	73.32
	95	Male	41	62.97	78.40
	96	Male	39	56.97	69.90
	97	Male	18	59.04	62.88
	98	Female	30	56.21	74.41
	99	Male	32	67.87	65.58
	100	Male	35	51.95	71.04
Control group (101~200)	101	Male	25	66.69	64.01
	102	Female	21	55.75	60.92
	103	Female	37	45.38	51.39
	104	Female	23	41.88	48.54
	105	Male	35	53.62	49.65
	106	Female	40	66.08	65.39
	107	Female	28	62.60	63.10
	108	Female	33	57.41	58.34

Continued Table A.3 General information and brain aging scores of the two groups of subjects

Group	Subject	Gender	Age	Before treatment	After treatment
Control group (101~200)	109	Male	36	58.50	56.03
	110	Female	29	60.00	53.47
	111	Female	35	59.58	51.19
	112	Male	19	59.12	45.25
	113	Male	41	50.14	57.69
	114	Male	20	50.71	58.54
	115	Male	18	54.87	50.17
	116	Female	44	55.67	60.14
	117	Male	29	49.44	59.33
	118	Female	34	53.76	54.91
	119	Male	26	55.77	58.27
	120	Male	20	48.27	58.85
	121	Female	19	54.98	60.35
	122	Female	36	55.11	56.07
	123	Male	27	53.69	61.28
	124	Female	28	50.51	49.22
	125	Male	34	53.93	56.81
	126	Male	29	52.72	53.56
	127	Female	30	54.64	69.75
	128	Female	19	59.27	55.63
	129	Female	28	58.05	63.99
	130	Male	36	51.46	62.59
	131	Female	26	61.56	49.67
	132	Male	34	56.39	59.85
	133	Male	38	54.19	64.59
	134	Male	38	64.65	56.59
	135	Female	36	51.63	61.27

Continued Table A.3 General information and brain aging scores of the two groups of subjects

Group	Subject	Gender	Age	Before treatment	After treatment
Control group (101~200)	136	Female	19	58.56	57.45
	137	Female	26	68.15	69.88
	138	Male	37	52.38	46.21
	139	Female	33	60.33	67.76
	140	Female	30	60.46	59.06
	141	Female	33	47.06	51.19
	142	Male	39	54.13	59.40
	143	Female	31	56.69	60.50
	144	Male	24	65.84	64.88
	145	Male	29	55.28	66.47
	146	Male	28	67.67	65.65
	147	Male	37	51.93	54.49
	148	Female	33	52.29	64.51
	149	Female	34	53.21	57.12
	150	Male	31	49.08	51.27
	151	Female	27	70.05	65.97
	152	Male	30	57.24	67.38
	153	Female	32	50.13	52.22
	154	Female	19	54.50	56.43
	155	Male	31	60.21	61.93
	156	Female	37	63.27	58.67
	157	Male	29	59.06	66.50
	158	Male	42	62.16	46.70
	159	Female	34	59.20	59.15
	160	Female	27	53.74	56.86
	161	Female	29	55.72	55.19
	162	Male	28	49.90	63.78

Continued Table A.3 General information and brain aging scores of the two groups of subjects

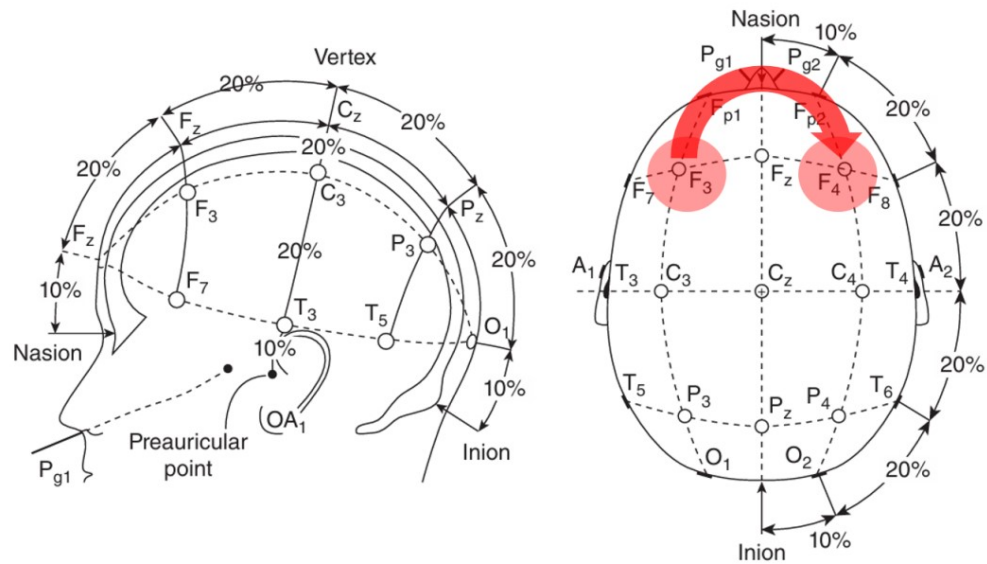
Group	Subject	Gender	Age	Before treatment	After treatment
Control group (101~200)	163	Male	32	64.26	61.41
	164	Male	36	56.44	56.77
	165	Male	28	60.66	55.53
	166	Male	33	62.18	58.48
	167	Male	43	59.96	63.30
	168	Female	37	56.74	55.81
	169	Male	36	57.71	52.59
	170	Male	24	52.61	58.65
	171	Female	26	71.51	53.60
	172	Male	32	59.65	60.61
	173	Female	29	60.03	45.76
	174	Female	18	47.50	62.84
	175	Female	18	51.79	59.30
	176	Female	38	62.96	62.95
	177	Female	24	65.27	62.13
	178	Male	46	65.78	74.38
	179	Male	19	51.56	56.18
	180	Male	33	46.44	57.21
	181	Male	30	54.61	52.21
	182	Male	24	57.54	67.67
	183	Male	33	52.50	64.58
	184	Male	24	53.13	57.97
	185	Female	37	51.55	45.73
	186	Female	31	61.94	75.76
	187	Female	19	49.53	55.09
	188	Male	19	62.16	59.58
	189	Female	28	61.13	55.06

Continued Table A.3 General information and brain aging scores of the two groups of subjects

Group	Subject	Gender	Age	Before treatment	After treatment
Control group (101~200)	190	Female	39	50.41	51.45
	191	Female	31	56.44	64.33
	192	Female	30	51.30	52.92
	193	Female	35	50.48	55.95
	194	Female	19	52.78	62.67
	195	Female	41	56.11	63.09
	196	Male	23	52.03	67.55
	197	Female	30	58.56	61.93
	198	Female	27	51.02	58.36
	199	Male	31	42.67	53.39
	200	Male	19	64.64	65.56

Appendix B

Diagram of intervention points based on the 10-20 international standard system



Appendix C Adult ADHD self-report scale (sample format)

Adult ADHD self-report scale, ASRS

No.: _____ Date of Completion: _____ Gender: ☐ M ☐ F Age: _____

Please use the five options on the right side of the table to conduct a self-assessment based on the following questions. When answering each question, please mark "✓" in the option box that best reflects your situation.					
	Never	Rarely	Sometimes	Often	Always
1. After completing the most challenging part, do you often have trouble finishing the remaining details?	0	1	2	3	4
2. Is it difficult for you to arrange organized tasks and things in an orderly manner?	0	1	2	3	4
3. Do you often forget appointments or things that need to be done?	0	1	2	3	4
4. Do you often avoid or procrastinate when working on a task that requires careful thought?	0	1	2	3	4
5. Do you fidget or squirm when you have to sit for long periods of time?	0	1	2	3	4
6. Do you feel like you are overactive and driven to do something, as if you are being driven by a motor?	0	1	2	3	4
Part A					
7. When you have to work on a boring or difficult project, do you make careless mistakes?	0	1	2	3	4
8. Do you have trouble staying focused when doing boring or repetitive tasks?	0	1	2	3	4
9. Do you have trouble focusing on what others are saying when you are face to face?	0	1	2	3	4
10. Do you have trouble locating or finding things at home or at work?	0	1	2	3	4
11. Are you distracted by outside noise or activity?	0	1	2	3	4
12. Do you leave your seat in meetings or other situations where silence is required?	0	1	2	3	4
13. Are you feeling restless or irritable?	0	1	2	3	4
14. Are you unable to calm down or relax when you are alone?	0	1	2	3	4
15. Do you feel that you talk too much in	0	1	2	3	4

social situations?					
16. When talking to someone, do you take over and finish the sentence before the other person has finished speaking?	0	1	2	3	4
17. Do you find it difficult to wait in a queue where you need to take turns?	0	1	2	3	4
18. Do you interrupt others when they are busy?	0	1	2	3	4
Part B					

Total score T ____ = ____ × 1 + ____ × 2 + ____ × 3 + ____ × 4

Evaluator: _____

Appendix D Attentional Control Scale (sample format)

Attentional control scale, ACS

No.: _____ Date of Completion: _____ Gender: ☐ M ☐ F Age: _____

The following is a description of attention. Please choose the answer that best describes your situation. (Strike out with “ ✓ ”)	Almost never	Sometimes	Often	Always
1. It is difficult for me to concentrate on a difficult task when there is noise around me. (R)	0	1	2	3
2. I have trouble concentrating when I need to concentrate on solving a problem. (R)	0	1	2	3
3. When I'm trying to do something, things around me can still distract me. (R)	0	1	2	3
4. Even if music is playing in the room around me, I can still concentrate.	0	1	2	3
5. When I am concentrating, I can concentrate so hard that I am not aware of what is going on around me.	0	1	2	3
6. When I am reading and researching, I am easily distracted if someone is talking in the room. (R)	0	1	2	3
7. I have trouble blocking out distracting thoughts when I try to focus on something. (R)	0	1	2	3
8. When I'm excited, it's hard for me to concentrate. (R)	0	1	2	3
9. When I was concentrating, I ignored the feelings of hunger and thirst.	0	1	2	3
10. I can quickly switch from one task to another.	0	1	2	3
11. It takes me a while to really get involved in a new mission. (R)	0	1	2	3
12. When writing notes in class, it is difficult for me to coordinate my attention between writing and listening. (R)	0	1	2	3
13. If I need to, I will quickly become interested in a new topic.	0	1	2	3
14. It is easy for me to read or write while I am on the phone.	0	1	2	3
15. I have trouble having two conversations at the same time. (R)	0	1	2	3
16. I have trouble coming up with a new idea quickly. (R)	0	1	2	3
17. After being interrupted or distracted, I can easily turn my attention to what I wanted to do before.	0	1	2	3
18. When a distracting thought comes into my mind, I	0	1	2	3

can easily turn my attention away from it.				
19. It is easy for me to take turns doing two different tasks.	0	1	2	3
20. It's hard for me to break one way of thinking and look at it from another perspective. (R)	0	1	2	3

Note: (R) indicates reverse scoring.

The following information is summarized by the evaluator based on the
information filled in by the subjects

Total score T ____ = ____ × 1 + ____ × 2 + ____ × 3

Evaluator: _____