Effect of Cognitive Rehabilitation Intervention on Hope and Depressive Mood State of the Elderly Cognitive Rehabilitation in Elderly

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Authors' contributions

This work was carried out in collaboration among all authors. Author SN designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author AN and VN and FT managed the analyses of the study. Author FT managed the literature searches. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Purpose: The aim of this study was to examine the effects of cognitive rehabilitation intervention on hope and depressive mood state of the elderly.
Methods: In this field trial, 70 retired elderly people were recruited via convenience sampling method and were randomly allocated into intervention and control groups (n=35 per group). The intervention group participated in 12 one-hour sessions of cognitive rehabilitation program, whereas the control group received no intervention. Data were collected using a demographics form, Geriatric Depression Scale (Yesavage, 1983), and Snyder et al.'s Hope Scale (1991).
Results: The mean depression score after intervention was significantly less in the intervention group than in the control group (P=0.004, t= 3.02). The mean hope score after intervention was significantly higher in the intervention group than in the control group (p <0.001, t= 4.38).

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Conclusion: Cognitive rehabilitation program can be a useful instrument for healthcare specialists to yield promising results. It can improve both the depressive mood and hope status in the elderly.

1. INTRODUCTION

Aging is an unquestionable reality of the modern society. The rise in life expectancy and the reduced birth rate in the developing and developed countries have resulted in considerable changes in the world population structure. As a result, the elderly population has significantly increased in the current age [1]. According to the United Nations' reports, the elderly population of the world is projected to double by the year 2050. By the same time, the elderly population in Iran is expected to increase by 4.5 times [2]. Meanwhile, public policy is facing mental health problems of the elderly as an important concern [1].

The depression is the most prevalent psychiatric disorder among the elderly across the world [3]. The prevalence of late-life depression worldwide is between 3 and 30 percent [3].

There is a strong correlation between increased age and variables of depression and reduced hope. Snyder (2000) defines hope as a cognitive process in which an individual sets goals, adopts a strategy to reach the goal, and maintains the motivation to thrive for attaining goals [4]. Older adults may experience less hope as they grow older [5].

A sense of helplessness, prospects of failure, depressed mood, and low self-efficacy have already been evident in a substantial number of patients suffering from mild cognitive impairment and are reported more often than other typical depressive symptoms [6].

A review article estimated mild cognitive impairment to have a 3-42% prevalence rate among the older adult population. Many diagnostic criteria have shown evidence of early cognitive changes in older adults [7].

The reason for the reduced speed of cognitive information processing in older adults comprise of decrease in the number of brain cells, weakened motor nerve cells, and decline in general activity. Cognitive dysfunction starts along with memory decline and is associated with disorientation, miscalculation, misjudgment, and impaired conceptual capacity [8]. Moreover, it is effective on all areas including memory, attention, language, spatial functioning, and executive functioning [7].

As the elderly may rely on false cognitive and unrealistic experiences during old age, the results of psychological interventions, especially cognitive interventions, propose a promising framework. The cognitive rehabilitation program (CRP) is one of the efficient ways to improve the psychological problems of the elderly. CRP involves a complicated set of techniques that strive to reinforce or re-establish old patterns, initiate new behavioral patterns, or present a mechanism that aspires to compensate for the cognitive dysfunctions of the damaged nervous system [9].

Cognitive rehabilitation can help patients improve their psychological functioning. Such improvement can, in turn, reduce the difficulties encountered by the patients in daily interactions in the family, working environment, and society in large [10]. CRP intervention has not been applied to the elderly in Iran and the cognitive problems of this group are almost underestimated. Moreover, given the sociocultural, environmental, and economic differences between Iran and other countries, the current study can justify the many research studies conducted in other countries in this regard. Therefore, the aim of this study was to examine the effect of cognitive rehabilitation training program on hope and depressive mood state of the elderly.

2. METHODS

2.1 Study Design and Participants

The current study is a field trial conducted with the participation of the retired elderly who referred to the Retirement Health Care Center affiliated with B University of Medical Sciences in 2016.

The participants were informed that their participation was voluntary and that they could leave the study at any stage. They were also assured that their identity and information would be kept confidential.

Based on the results of Winocur et al's study (2007) [11]. the confidence level and test power were considered as 95% and 80% respectively, and given the possibility of attrition, 35 participants were incorporated for each group (70 in total).

The inclusion criteria were as follows: 1. depression score below 10 based on the Geriatric Depression Scale (GDS) criteria (people with severe depression or with a history of admission were excluded); 2. absence of a known psycho-neurological or cognitive impairment; 3. informed consent to participate; 4. reading and writing literacy; 5. ability to speak and communicate; and 6. no sensory-motor problem. A total of 70 retired elderly individuals were incorporated using convenience sampling method and were randomly allocated into intervention and control groups (n=35 per group). They filled the demographic characteristics forms, and the depression and hope scales were completed before and after intervention.

2.2 Cognitive Rehabilitation Intervention

The content related to "attention" in the CRP employed in this study was developed based on Solberg and Matyer's model (2001) [12]. Furthermore, the content related to "active memory" was based on Baddeley's model (1986) [13]. The sessions for the intervention group consisted of 12 group sessions each held for 60 minutes. They were held twice a week for 6 weeks in the conference hall of the Research Center of B University of Medical Sciences. The contents of the sessions are presented in Table 1. In each session, twenty minutes were devoted to attention-related tasks and five minutes to memory-related tasks. Also, five cards were presented in each session. In order to ensure that the individual has reached the highest performance in previous assignments, the next session initiated by a general overview of the contents written on the previous cards and continued by following contents transcribed on the subsequent cards of the session. The program aimed to reinforce the participant's progress and feedback. For the control group, no intervention was performed. After 6 weeks of follow-up of the rehabilitation program, the depression and hope scales were completed by the control and intervention groups.

2.3 Measurements

The data collection tool included a demographic characteristics form including items on gender, age, place of residence, marital status, occupation, retirement age, and education level.

2.4 The Geriatric Depression Scale (GDS)

The Geriatric Depression Scale (GDS) designed by Yesavage et al. (1986) [14] was used to measure depression. The scale comprises 15 items answered by "Yes" and "No" such that "No" is scored 0 and "Yes" as 1. Items 1, 5, 7, 11 and 13 are scored in reverse by "No" to which 1 is assigned and "yes" to which 0 is assigned. The minimum score is 0 and the maximum is 15. A score of 0-4 indicates absence of depression, a score of 5-9 shows mild depression, and a score of 10-15 represents severe depression. The validity and reliability of this questionnaire have been verified for the Iranian elderly population. The reliability coefficient of the depression scale in the elderly according to the Cronbach's alpha is 0.92 [15].

2.5 The Trait Hope Scale

The "Trait Hope Scale" designed by Snyder et al. (1991) [16] was used to measure the elderly's hope status. This scale is an appropriate test to measure hope among the elderly and has 8 questions used as self-assessment. Scoring was conducted based on the 5-point Likert scale from "strongly disagree" scored as 1 to "strongly agree" with the score 5. The minimum score in this scale is 8 and the maximum is 40. In the study by Southerland et al. (2016), the reliability coefficient of the hope scale in the elderly as reported using the Cronbach's alpha was 0.88 [17]. According to Elahi (2014), the reliability of this scale for the Iranian samples using the internal consistency coefficient is 0.89 [18].

2.6 Statistical Analysis

Data were analyzed by SPSS (version 16) using descriptive statistics including frequency (percentage), mean and standard deviation, and paired and independent t-test, after the data distribution was found normal using Kolmogorov–Smirnov test. The significance level was set at $p < 0.05$.

3. RESULTS

In the current study, the age means of the intervention and control groups were 61.03±3.81 and 61.02±2.37 years, respectively. There was no significant difference between the two groups

(p= 0.981, t=0.01). The average retirement lengths in the intervention and control groups were 8.43 ± 5.31 and 8.0 ± 3.86 years, respectively, with no significant difference between the two groups (p=0.704, t=0.38).

As Table 2 demonstrates, most of the subjects in the two groups were women out of whom 69 (98.6%) were married, 56 (80.0%) had completed high school education, and 30 (42.9%) were paramedics.

Table 1. Contents of the intervention program

Sessions	Topics of each session
1	Creating and establishing the therapeutic alliance and familiarizing the participants with cognitive methods and practices, completing the questionnaires of depression and hope, and presenting of the worksheet related with the explanation of the CRP.
2	Building a bridge to the previous session (getting feedback from the previous session), attention exercises including selective attention with visual stimuli (via setting the cards) Memory exercises: Tasks for learning pictures (copying images, memorizing, and drawing pictures from memory)
3	Attention exercises through crossword puzzle assignment (finding meaningful words in rows, columns and the diameter of the given puzzles) Memory exercises include tasks of explicit learning of the words (memorizing words and expressions)
4	Giving written assignments such as finding the words (finding meaningful words from among groups of non-words) Memory assignments include implicit learning assignments (consisting of double cards, presenting the words of a card, and then the words of the next card, and finding words from the former card that are repeated in the latter card)
5	Attention shift exercises including storytelling tasks (listening to different stories, and answering the story questions) Memory assignments including learning word pairs (establishing relationships between word pairs, and memorizing associated pairs)
6	Presenting assignments that enhance sustained attention including the task of finding target images (finding target images) Memory exercises including word formation tasks (making new words with the letters of words in each card)
7	Presenting assignments for enhancing the selective attention such as differentiating between images (finding the difference between images) Memory assignments including omitting the letters of the words (keeping words in mind, and finding the missing letters)
8	Presenting assignments to enhance selective attention including the task of discovering components of images (finding the given parts of an image) Memory assignments including pairing the words of each row
9	Delivering assignments to enhance selective attention including search for similar geometric shapes (i.e., specifying the target image) Memory exercises such as the task of memorizing the previous shape 1 that can entail assignments 1 to 6 (comparing numbers, letters and shapes with previous numbers, letters and shapes, and checking if they are similar to the previous ones)
10	Strengthening the inhibitory control including the task of purposeful addition of numbers 1, which includes assignments 1 to 3 (summing up the odd and even numbers in each column separately) Memory exercises including the task of memorizing a previous shape 2 that includes assignments 7 to 10 (comparing numbers, letters, and shapes with two previous numbers, letters, and shapes, and checking if they are similar to the two previous items)
11	Strengthening the inhibitory control including the task of purposeful addition of numbers 2 that includes assignments 4-6 (summing up the numbers above 5 and below 5 in each column separately) Enhancing phonological awareness including the search for the letters of a word (finding the letters of words, or removing the additional letters)
12	Strengthening the inhibitory control including the task of purposeful addition of numbers 3 that includes assignments 7 to 10 (summing up the red and blue numbers in each column separately) Preparing the participant for the phase out of the cognitive-rehabilitation training program; reviewing cognitive exercises of attention, memory, and executive function; and completing the depression and hope questionnaires.

Table 2. Comparison of frequency distribution of demographic characteristics in intervention and control groups

Variable	Intervention group (35 cases)	Control group (35 cases)	Statistics
Educational level (%)			
Under diploma	0 (0.0%)	1 (1.4%)	χ2=1.15
Diploma	29 (41.4%)	27 (38.6%)	p=0.564
Academic	6 (8.6%)	7 (10.0%)	
Gender (%)			
Male	6 (8.6%)	6 (8.6%)	P=0.625
Female	29 (41.4%)	29 (41.4%)	
Marital status (%)			
Married	34 (48.6%)	35 (50.0%)	P=0.513
single	1 (1.4%)	0 (0.0%)	
Job category (%)			
Nurse	5 (7.1%)	6 (8.6%)	χ2=7.40
Nurse-aid	3 (4.3%)	3 (4.3%)	p=0.382
Paramedic	18 (25.7%)	12 (17.1%)	
Anesthesiology	1 (1.4%)	0 (0.0%)	
Help assistant	2 (2.9%)	7 (10.0%)	
Health engineer	3 (4.3%)	6 (8.6%)	
Midwives	2 (2.9%)	1 (1.4%)	
Laboratory	1 (1.4%)	0 (0.0%)	

Differences in gender, marital status, education, and occupation were not statistically significant between the two groups. The comparison of the depression score in intervention and control groups before and after intervention is presented in Table 3.

The mean depression scores in the intervention group before and after intervention were 5.03±2.59 and 3.06±2.35, respectively. The results of paired t-test showed that the depression score in the intervention group was significantly lower after intervention than before intervention (p <0.001). This difference was not observed in the control group (p=0.075). Based on the independent t-test, the mean score of depression after intervention was significantly lower in the intervention group compared with the control group. Comparison of hope scores in intervention and control groups before and after intervention is presented in Table 4.

The mean scores of hope in the intervention group before and after intervention were 33.08 ± 3.15 and 36.08 ± 2.52, respectively. Based on the results of paired t-test, the mean hope score in the post-intervention phase was significantly higher than that of the pre-intervention stage (p<0.001). This difference was not observed in the control group (p=0.844). Based on the independent t-test, the mean of hope scores after intervention was significantly higher in the intervention group than in the control group.

Table 3. Comparison of the mean depression score in elderly people before and after intervention in the intervention and control groups

Variable	Group	Before intervention	After intervention	Statistics
Mood Score	Control group	5.09±2.49	4.74±2.31	P=0.075, t=1.87
	Intervention group	5.03±2.59	3.06±2.35	P <0.001, t=5.11
Significance		P=0.930, t=0.09	P=0.004, t=3.02	

Table 4. Comparison of mean hope scores before and after intervention in intervention and control groups

Variable	Group	Before intervention	After intervention	Statistics
Mood Score	Control group	33.03±3.26	33.06±3.26	P=0.844, t=0.21
	Intervention group	33.08±3.15	36.08±2.52	p<0.001, t=8.56
Significance		P=0.941, t=0.07	p<0.001, t=4.38	

4. DISCUSSION

The purposes of this study were to determine the efficacy of the CRP on the elderly's hope and depressive mood state. The results of this study showed that cognitive rehabilitation intervention significantly changes mood and hope levels in the elderly so that the level of depressive mood decreased after intervention. This improvement may be due to the multidimensional nature of the treatment program. The results of Winocur et al.'s study (2007) in Canada on the effectiveness of cognitive rehabilitation program on depression in the elderly are in line with the results of this study. They showed that training memory skills helped in the process of acquiring, retaining, and recovering information; thus, the rehabilitation program had a significant effect on depression improvement [11].

Luciane et al. (2011) examined the effects of cognitive rehabilitation program on the depression of 25 elderly patients with Alzheimer's disease in Brazil. Upon adoption of memory rehabilitation program and expressive activities such as painting, verbal expression, and writing, they found improved symptoms of depression in both groups of patients and caregivers [19], which is consistent with the results of this study.

The study by Hindel et al. (2018) with the aim of evaluating the effectiveness of targeted cognitive rehabilitation for dementia patients was a randomized controlled trial. In this study, the participants were randomly assigned into three groups: 10 people received cognitive rehabilitation, 10 relaxation therapies, and 9 received traditional medicine therapy. The results of this study showed that cognitive rehabilitation improved depression more effectively than other therapies [9]. In this study, the effect of cognitive rehabilitation intervention on depression has been investigated and the memory rehabilitation program (memorization and recall memories) has been used, which is in line with the current study.

Moreover, as a randomized controlled pilot trial, Cuc et al.'s study (2017) aimed to evaluate the effectiveness of cognitive memory rehabilitation on depression of people with mild cognitive impairment. The results of the study showed that cognitive rehabilitation improved depression [20]. Although the statistical population in this study is different from that of the present study, the results are similar and indicate the impact of

cognitive rehabilitation program on reducing depression.

In the studies on the effect of cognitive rehabilitation program on depression, contradictory results have been reported as well.

The study by Clare et al. (2013), which aimed at investigating the effect of targeted cognitive rehabilitation on 480 elderly people in a randomized clinical trial, compared the three methods of cognitive rehabilitation, relaxation therapy, and treatment as usual. It was concluded that cognitive rehabilitation did not have a significant effect on depression scores in comparison with other methods [21]. The reason for the discrepancy between this study and ours can be attributed to the difference in the target populations, where the population in their study comprised of elderly people with vascular or mixed dementia. In their study, the main aim was to compare several therapies, which is different from that of the present study. On the other hand, the intervention in their study was conducted at home and the number of intervention sessions was 10 sessions, while our study was conducted under the supervision of a trained instructor and at a specified center with more sessions (12 sessions) that may have been effective on the results of the intervention. Also, the instrument used to measure depression in their study includes two subscales that are different from those used in the current study. Moreover, the difference in the cultural context may have also been effective on the results.

Tokuchi et al. (2016) aimed to investigate the effect of combination therapy with galantamine plus cognitive rehabilitation retrospectively on 86 patients with Alzheimer's disease. The subjects were assigned into two groups. One group only received galantamine treatment and the other received galanthamine plus cognitive rehabilitation. The results showed that there was an improvement in depression score although the difference was not significant [22]. The reason for this discrepancy could be the difference in the target population of the study, i.e., the elderly with Alzheimer's. In this study, the comparison of galantamine alone and combined with a cognitive rehabilitation program has been studied, while our study focused solely on the cognitive abilities created by the cognitive rehabilitation program on depression.

Also, in a study by Salotti et al. (2013), the aim was to evaluate the effectiveness of cognitive

rehabilitation intervention on 9 women suffering from Alzheimer's in Italy. The results showed that there was no significant difference between the two groups in baseline performance evaluation and the mean depression score after cognitive rehabilitation intervention [23].

Based on the results of this study, after the treatment, the mean hope score for the intervention group was significantly higher than that of the controls. Although we did not find a study that looked at the effectiveness of the cognitive rehabilitation program on the structure of hope, the results of Kesler et al. (2010) showed that cognitive rehabilitation has a significant effect on the improvement of cognitive executive functions, while it simultaneously impacts on brain functions of individuals [24]. Hope is a cognitive construct that is affected by executive functions. Considering the results of various studies to indicate a significant association between cognitive functions and factors such as mental health [25] and life expectancy [26], the hope score is therefore expected to increase among individuals as an outcome of improved executive functions.

As an explanation for the results of CRP's impact on hope status of the elderly, one can refer to Snyder's hope theory and his explanation on hope as an outgrowth of improved coping strategies. According to Snyder (2006), hope consists of a cognitive set involving an understanding that one can create pathways to a desired goal (route thinking), while having the incentive to reach a goal (agency thinking). Hope, therefore, has three essential and interrelated components. The agency and goal finding also act as motivational factors [27]. In this respect, the results of Nejati et al. show a significantly positive correlation between the hope structure and cognitive structures such as sustained attention, planning, problem-solving, and shifting attention, which confirms Snyder's hope theory [26]. Additionally, people with reduced hope use fewer effective coping strategies [28,29] and are often emotion-focused. Similarly, the results of Campbell et al. (2008), studying the role of executive functions in coping and behavioral strategies, demonstrated that there is a meaningful relationship between coping strategies and executive functions in individuals [30].

Accordingly, along with the problems concerning executive functions, weakness in coping strategies that are used to address problems is a contributory factor to decreasing hope among this group of individuals. Thus, applying cognitive rehabilitation improves one's executive functions and subsequently coping strategies, and the outcome of this can be understood from improved hope score.

5. CONCLUSION

Based on the findings of this study, the CRP, including attention and memory exercises, was effective for the elderly who had some degree of depression and low hope. Therefore, it is advisable to counselors and therapists to consider the above method to help such patients. It is also suggested that those who run nursing homes apply such programs for older adults who live in the given centers.

CONSENT AND ETHICAL APPROVAL

This research protocol was approved by the Ethics and Research Committee of B University of Medical Sciences (Identifier: Ir. bums. REC. 2016.132). Informed consent was obtained from potential research subjects after explaining the goals of the study to them.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Park JI, Park TW, Yang JC, Chung SK. Factors associated with depression among elderly Koreans: The role of chronic illness, subjective health status, and cognitive impairment. Psychogeriatrics 2016;16(1): 62-69.
Available:https://doi.org/10.1111/psyg. 12160

2. United.Nations. Population aging and development; 2015.
Available:http://www.un.org/en/developme nt/desa/population/publications/pdf/

ageing/2015PopAgeingandDev_WallChart.pdf.
[Cited 2015 Dec 25].

3. Giri M, Chen T, Yu W, Lü Y. Prevalence and correlates of cognitive impairment and depression among elderly people in the world's fastest growing city, Chongqing, People's Republic of China. Clin Interv Aging 2016;11:1091-8.
Available:https://doi.org/10.2147/CIA.S113668.

4. Bahmani B, Najjar MM, Sayyah M, Shafi-Abadi A, Kashani HH. The effectiveness of cognitive-existential group therapy on increasing hope and decreasing depression in women-treated with haemodialysis. Glob J Health Sci 2016; 8(6): 219-225.
Available:https://doi.org/10.5539/gjhs.v8n6p219

5. Mitchell UA, Ailshire JA, Brown LL, Levine ME, Crimmins EM. Education and psychosocial functioning among older adults: 4-year change in sense of control and hopelessness. J Gerontol. 2016; 73 (5): 849–859.
Available:https://doi.org/10.1093/geronb/gbw031

6. Choi J, Twamley EW. Cognitive rehabilitation therapies for Alzheimer's disease: a review of methods to improve treatment engagement and self-efficacy. Neuropsychol Review. 2013;23(1):48-62.
Available:https://doi.org/10.1007/s11065-013-9227-4.

7. Huckans M, Hutson L, Twamley E, Jak A, Kaye J, Storzbach D. Efficacy of cognitive rehabilitation therapies for mild cognitive impairment (MCI) in older adults: working toward a theoretical model and evidence-based interventions. Neuropsychol Review 2013; 23(1):63-80.
Available:https://doi.org/10.1007/s11065-013-9230-9

8. Lee YM, Jang C, Bak IH, Yoon JS. Effects of computer-assisted cognitive rehabilitation training on the cognition and static balance of the elderly. J Phys Ther Sci 2013;25(11):1475-77.
Available:https://doi.org/10.1589/jpts.25.1475

9. Hindle JV, Watermeyer TJ, Roberts J, et al. Goal-orientated cognitive rehabilitation for dementias associated with Parkinson's disease-A pilot randomised controlled trial. Int J Geriatr Psychiatry 2018;33(5):718-728.

10. Priyamvada R, Ranjan R, Chaudhury S. Cognitive rehabilitation of attention and memory in depression. Ind Psychiatry J. 2015;24(1):48-53.
Available:https://doi.org/10.4103/0972-6748.160932

11. Winocur G, Palmer H, Dawson D, Binns MA, Bridges K, Stuss DT. Cognitive rehabilitation in the elderly: An evaluation of psychosocial factors. J Int Neuropsychol Soc. 2007;13(1):153-65.
Available:https://doi.org/10.1017/S135561770707018X

12. Sohlberg MM, Mateer CA. Cognitive Rehabilitation: An Integrative Neuropsychological Approach Guilford Publications, Inc; 2001.

13. Baddeley AD. Working Memory. Oxford: Clarendon Press; 1986.

14. Sheikh JI, Yesavage JA. Geriatric Depression Scale (GDS): recent evidence and development of a shorter version. Clinical Gerontologist: Aging Ment Health 1986;5(1):165-173.
Available:http://dx.doi.org/10.1300/J018v05n01_09

15. Aflakseir A-A, Mohammad-Abadi M-S. The role of health locus of control in predicting depression symptoms in a sample of Iranian older adults with chronic diseases. Iranian J Psychiatry. 2016;11(2):82-86.

16. Snyder CR, Harris C, Anderson JR, et al. The will and the ways: Development and validation of an individual-differences measure of hope. J Pers Soc Psychol. 1991;60(4):570-85.

17. Southerland JL, Slawson DL, Pack R, Sörensen S, Lyness JM, Hirsch JK. Trait Hope and Preparation for Future Care Needs among Older Adult Primary Care Patients. Clinical gerontologist. 2016;39(2): 117-26.
Available:https://doi.org/10.1080/07317115.2015.1120254

18. Elahi T, Khosravi R, Rashidi Rashtabadi S, Akhavan A. Hopefulness and Mental Disorders in the Elderl. ZUMSJ. 2014; 22(92):119-125.

19. Viola LF, Nunes PV, Yassuda MS, Aprahamian I, Santos FS, Santos GD, et al. Effects of a multidisciplinar cognitive rehabilitation program for patients with mild Alzheimer's disease. Clinics (Sao Paulo). 2011;66(8):1395-400.

20. Cuc AV, Locke DE, Duncan N, Fields JA, Snyder CH, Hanna S, Lunde A, Smith GE,

Chandler M. A pilot randomized trial of two cognitive rehabilitation interventions for mild cognitive impairment: caregiver outcomes. Int J Geriatr Psychiatry. 2017; 32(12):e180-7.
Available:https://doi.org/10.1002/gps.4689

21. Clare L, Bayer A, Burns A, Corbett A, Jones R, Knapp M, Kopelman M, Kudlicka A, Leroi I, Oyebode J, Pool J. Goal-oriented cognitive rehabilitation in early-stage dementia: study protocol for a multi-centre single-blind randomised controlled trial (GREAT). Trials. 2013;14(1):152.
Available:https://doi.org/10.1186/1745-6215-14-152

22. Tokuchi R, Hishikawa N, Matsuzono K, Takao Y, Wakutani Y, Sato K,, et al. Cognitive and affective benefits of combination therapy with galantamine plus cognitive rehabilitation for Alzheimer's disease. Geriatr Gerontol Int. 2016;16(4): 440-5.
Available:https://doi.org/10.1111/ggi.12488

23. Salotti P, De Sanctis B, Clementi A, Ferreira MF, De Silvestris T. Evaluation of the efficacy of a cognitive rehabilitation treatment on a group of Alzheimer's patients with moderate cognitive impairment: a pilot study. Aging Clin Exp Res. 2013;25(4):403-9.
Available:https://doi.org/10.1007/s40520-013-0062-5

24. Kesler SR, Lacayo NJ, Jo B. A pilot study of an online cognitive rehabilitation program for executive function skills in children with cancer-related brain injury. Brain Inj. 2011;25(1):101-12.
Available:https://doi.org/10.3109/02699052.2010.536194

25. Hagenaars SP, Harris SE, Davies G, Hill WD, Liewald DC, Ritchie SJ, et al. Shared genetic aetiology between cognitive functions and physical and mental health in UK Biobank (N= 112 151) and 24 GWAS consortia. Mol Psychiatry. 2016;21(11): 1624-1632.
Available:https://doi.org/10.1038/mp.2015.225

26. Nejati V, Sh S, Gh M, Darvishi Lord M. Cognitive correlates of hope; Evidence from neuropsychological tests. Advance Cog Sci. 2013;14(4):29-38.

27. Snyder CR. The past and possible futures of hope. J Soc Clinic Psychol. 2000;19(1): 11-28.
Available:https://doi.org/10.1521/jscp.2000.19.1.11

28. Davidson CL, Wingate LR, Slish ML, Rasmus KA. The great black hope: Hope and its relation to suicide risk among African Americans. Suicide Life Threat Behav. 2010;40(2):170-80.
Available:https://doi.org/10.1521/suli

29. Ghodraty-Jabloo V, Alibhai SM, Breunis H, Puts MT. Keep your mind off negative things: coping with long-term effects of acute myeloid leukemia (AML). Support Care Cancer. 2016;24(5):2035-2045.
Available:https://doi.org/10.1007/s00520-015-3002-4

30. Campbell LK, Scaduto M, Van Slyke D, Niarhos F, Whitlock JA, Compas BE. Executive function, coping, and behavior in survivors of childhood acute lymphocytic leukemia. J Pediatr Psychol. 2009; 34(3):317-27.
Available:https://doi.org/10.1093/jpepsy/jsn080