



The Efficacy of Cognitive Rehabilitation on Cognitive Distortion, Depression, and Life Expectancy of the Elderly with Mild Alzheimer's

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ABSTRACT

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The present study aimed to evaluate the effectiveness of cognitive distortion, depression, and life expectancy of the elderly with mild Alzheimer's. The present study was a quasi-experimental interventional study with pre-test and post-test conducted on the elderly with mild Alzheimer's disease who were referred to day rehabilitation centers in Ardabil in 2025. Of these, 36 elderly individuals with mild Alzheimer's disease were selected via convenience sampling and randomly assigned to either the experimental group (n=18) or the control group (n=18). The experimental group received ten 60-minute sessions of a computer-based cognitive rehabilitation program. Data were collected using the Cognitive Distortions Questionnaire, Beck Depression Inventory, and Snyder's Hope Scale. The data were analyzed using multivariate analysis of covariance (SPSS-28). The findings revealed that cognitive rehabilitation significantly decreases unrealistic relationship expectations ($F=34.31$), interpersonal rejection ($F=21.22$), interpersonal misperception ($F=30.49$), and depression ($F=32.28$), and increases agency thinking ($F=17.24$), and pathways thinking ($F=24.20$) in the elderly with mild Alzheimer's disease ($P<0.01$). The findings of the present study collectively highlight the comprehensive efficacy of cognitive rehabilitation in elderly individuals with mild Alzheimer's disease. By targeting cognitive distortions, alleviating depressive symptoms, and fostering healthier lifestyle practices, the intervention demonstrates multidimensional benefits that extend beyond isolated cognitive improvements.

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Introduction

Healthy aging is typically marked by modest cognitive changes, such as slower processing speed, slight reductions in working memory capacity, and diminished mental flexibility, that, while noticeable, do not interfere with daily independence (Mukherjee et al., 2024). These age-related shifts become concerning when they begin to exceed normal expectations, signaling the transition toward mild Alzheimer's (Sritana & Phungpinij, 2024). At this early stage, older adults may still manage most routine tasks but increasingly struggle with recent-memory retention, multitasking, complex problem-solving, and adapting to unfamiliar environments (Wang et al., 2025). Their awareness of these inconsistencies can provoke anxiety, frustration, or a retreat from social engagement (Jemimah et al., 2023). Early recognition of these deviations, paired with structured routines, evidence-based cognitive stimulation, and supportive interpersonal environments, is critical to maintaining autonomy and slowing the trajectory of neurodegenerative decline (Mandal et al., 2022). Park et al. (2025) reported that among older adults living in publicly subsidized housing in the United States, the pooled prevalence of mild cognitive impairment was 25.5%, while the prevalence of Alzheimer's disease and related dementias was 13.5%, highlighting the need for improved cognitive screening in this population.

Cognitive distortions, systematic errors in interpreting information, can become more salient in older adults as natural age-related changes influence processing speed, cognitive flexibility, and emotional regulation (Schäfer et al., 2024). Although these changes are not inherently pathological, they may increase reliance on habitual mental shortcuts, making older individuals more vulnerable to biased thinking patterns such as catastrophizing, overgeneralization, or negative labeling (Rallabandi et al., 2023). These distorted appraisals can shape how aging adults interpret memory lapses, physical symptoms, and social interactions, often amplifying perceptions of threat or personal inadequacy (Nukhat et al., 2024). The presence of cognitive distortions in later life can meaningfully affect psychological resilience and adaptive functioning (Zhang et al., 2023). Older adults who adopt rigid or pessimistic interpretations of everyday events may experience elevated stress reactivity, reduced motivation to engage in social or cognitive activities, and increased withdrawal from challenging environments (Dominguez et al., 2024).

Depression in older adults arises from a complex interplay of biological, psychological, and social factors that accumulate across the lifespan (Wei et al., 2025). Age-related neurochemical changes, chronic health conditions, functional decline, and bereavement all contribute to elevated risk (Quintana-Hernández et al., 2023). Unlike younger populations, depressive symptoms in older adults often present in subtler forms, such as fatigue, slowed cognition, sleep disruption, or somatic complaints, leading to underdiagnosis and delayed treatment (Zandpour et al., 2024; Kim et al., 2021). This atypical presentation reflects both physiological changes in aging and a tendency to normalize emotional distress as an inevitable part of growing older (Cutuli et al., 2022). The impact of depression on older adults extends beyond mood disturbance, often affecting cognition, physical functioning, and long-term health outcomes (Sáiz-Vázquez et al., 2021). Depressed older adults may demonstrate reduced adherence to medical recommendations, diminished engagement in meaningful social activities, and lower participation in preventive health behaviors (Wei et al., 2025).

Life expectancy in older adults is determined by a multidimensional constellation of factors, including biological health, lifestyle behaviors, socioeconomic context, and psychological resilience (Xiaopeng et al., 2025). Advances in medical science and public health have extended longevity, yet disparities persist across demographic groups (Lee et al., 2024). Functional independence, effective chronic disease management, and sustained cognitive vitality play central roles in shaping both lifespan and health span (Mooldijk et al., 2022). Older adults who maintain active lifestyles, balanced nutrition, and regular health monitoring are more likely to experience prolonged and higher-quality longevity (Lanctot et al., 2024). Psychosocial factors also significantly impact life expectancy among older adults. A strong sense of purpose, sustained social connectedness, and emotional stability are associated with healthier physiological profiles, lower systemic inflammation, and reduced risk of morbidity (Mostert et al., 2025).

Cognitive rehabilitation has demonstrated considerable efficacy in supporting older adults by targeting specific cognitive domains that often decline with age, including memory, attention, executive functioning, and processing speed (He et al., 2022). Through structured tasks, guided practice, and individualized strategy training, cognitive rehabilitation promotes neurocognitive engagement that strengthens underlying neural pathways (Rajji et al., 2020). Evidence from neuropsychological and neuroimaging research shows that such interventions can enhance cognitive efficiency, improve compensatory mechanisms, and slow the trajectory of age-related cognitive weakening, making them particularly valuable for older adults experiencing early cognitive changes or mild neurodegenerative conditions (Manenti et al., 2020). Beyond measurable cognitive gains, cognitive rehabilitation makes a meaningful contribution to functional independence in older adults (Justo-Henriques et al., 2025). By teaching targeted strategies, such as external memory aids, problem-solving routines, and environmental modifications, rehabilitation programs translate cognitive improvements into real-world benefits (Tortora et al., 2024).

Older adults who participate consistently often demonstrate improved medication management, better adherence to daily routines, more effective decision-making, and heightened confidence in navigating complex tasks (Kudlicka et al., 2023). These functional enhancements reduce caregiver burden, support aging-in-place, and contribute to greater autonomy, which is a central goal in geriatric care (Irazoki et al., 2020). Cognitive rehabilitation also exerts significant psychological and psychosocial benefits, further amplifying its overall effectiveness in aging populations (Shabahang et al., 2020; Chang et al., 2022). Participation in structured cognitive programs fosters a sense of mastery, self-efficacy, and active engagement, which can counteract emotional vulnerabilities such as anxiety, frustration, or depressive symptoms associated with cognitive decline (Osawa et al., 2025). Moreover, group-based interventions promote social interaction and reduce feelings of isolation, creating an environment that reinforces cognitive resilience and emotional well-being (Nissim et al., 2023). By addressing both cognitive and psychosocial dimensions, cognitive rehabilitation emerges as a comprehensive, evidence-based approach that enhances quality of life and supports healthy, empowered aging (Perra et al., 2023).

In older adults with mild Alzheimer's disease, cognitive decline not only impairs memory and executive functioning but also contributes to cognitive distortions, depressive symptoms, and potentially influences life expectancy. Addressing these challenges early is essential to

preserving independence, enhancing psychological well-being, and improving overall health outcomes. Cognitive rehabilitation offers a structured, evidence-based approach to strengthen residual cognitive abilities, develop compensatory strategies, and foster adaptive coping mechanisms. The ultimate aim of this intervention is to evaluate and enhance the efficacy of cognitive rehabilitation on reducing cognitive distortions, alleviating depression, and positively impacting life expectancy in elderly individuals with mild Alzheimer's, thereby promoting autonomy, emotional resilience, and quality of life.

Method

The present study was a quasi-experimental interventional study with pre-test and post-test conducted on the elderly with mild Alzheimer's disease who were referred to day rehabilitation centers in Ardabil in 2025. After preparing a list of 36 patients (who had been diagnosed with mild Alzheimer's disease by a neurologist), the researchers selected 18 patients for the experimental and control groups by lottery. Sample size determination was guided by prior research and calculated using G*Power software, with parameters set as follows: effect size = 1.25, statistical power ($1 - \beta$) = 0.97, and significance level (α) = 0.05 (Kovač et al., 2025; Kang, 2021). The inclusion criteria for the study included elderly people aged 60 years and older, elderly people with mild Alzheimer's with a test score of less than 23 who had been approved by a geriatrician through a brain MRI examination, completing a consent form, participating and cooperating to participate in classes, and residing in Ardabil city. Exclusion criteria from the study also included elderly patients with restlessness, lack of cooperation from clients, and non-attendance or absence from more than two sessions.

Research instruments

Cognitive Distortions Questionnaire (CDQ): Hamamci & Büyüköztürk designed the Interpersonal Cognitive Distortions Questionnaire for the first time in 2004. This questionnaire has 19 items and includes 3 dimensions of rejection in interpersonal relationships, unrealistic expectations in relationships, and misunderstanding in interpersonal relationships. The items are rated on a 5-point Likert scale from strongly disagree (score 1), disagree (score 2), no opinion (score 3), agree (score 4) to strongly agree (score 5). To obtain the total score of this questionnaire, the scores of all 3 dimensions must be added. The range of scores on this questionnaire is from 19 to 95. Scores close to 95 indicate high levels of interpersonal cognitive distortion, and scores close to 19 indicate low levels of interpersonal cognitive distortion. In the research of Hamamci & Büyüköztürk (2004), the reliability of this questionnaire was obtained through internal consistency and Cronbach's alpha coefficient and the test-retest method after 2 weeks for the entire scale (0.67 and 0.74), and for the dimensions of rejection in interpersonal relationships (0.73 and 0.70), unrealistic expectations in relationships (0.66 and 0.76), and misunderstanding in interpersonal relationships (0.43 and 0.73), respectively. In the present study, the Cronbach's alpha coefficient for the total score and the three subscales ranged from 0.80 to 0.87.

Beck Depression Inventory (BDI): is a widely used self-report questionnaire designed to measure the severity of depression symptoms in individuals aged 13 and older (Beck, Steer & Brown, 1996). The BDI consists of 21 multiple-choice items, each corresponding to a specific symptom of depression. The scoring method of the items ranges from 0 to 3, with scores ranging from 0 to 63. Beck et al (1996) reported the validity of this test as 96.0, with internal consistency ranging from 73.0 to 92.0 with a mean of 86.0, and Cronbach's alpha coefficient for patients

and non-patients as 0.86 and 0.81, respectively. In the current study, Cronbach's alpha coefficient of this scale was also obtained at 0.89.

Snyder's Hope Scale (SHS): The hope scale, prepared by Snyder et al (1991), has 12 items and aims to evaluate the hope in an individual regarding self-assessment. The items are scored on a 5-point Likert scale and measure agency thinking and pathways. There are 4 items to measure agency thinking, 4 items to measure pathways, and 4 deviant items. Scores between 12-24 indicate a low level of hope. Scores between 24 and 36 indicate average hope, and scores higher than 36 indicate a high level of hope (Snyder et al., 1991). The Hope Scale has acceptable internal consistencies (alphas of .74 to .88 across several studies) (Snyder et al., 1991). The test-retest reliability of the total score, agency thinking, and pathways subscales was .85, .81, and .74 in a three-week interval, respectively (Snyder et al., 1991). The Hope Scale also has good convergent validity with the optimism scale ($r = .50$) and the desire for personal control ($r = .54$). In the present study, the Cronbach's alpha coefficient for the total score and the two subscales ranged from 0.84 to 0.93.

The Cognitive Rehabilitation: This program was implemented for 10 sessions of 60 minutes, two sessions per week. This program is a type of computer software that was developed based on the attention hierarchy system and the working memory model (Franco-Martín et al., 2020). This software consists of 10 exercises that are arranged in a progressive 10-stage manner from simple to difficult. After obtaining 80% of the correct answers, the individual can proceed to the exercises of the next stage, and this process continues until the individual can obtain the 80% score for that stage in each stage. Otherwise, the exercises of the same stage will be presented to him again so that he can finally achieve success. The final assignments and exercises of the cognitive rehabilitation software for maintaining attention and memory include 10 main exercises. Which is repeated during 10 intervention sessions, and only if successful in the first session (achieving a score of 80 or higher in each exercise) will the game level be moved to a more difficult stage (See Table 1). After collecting the research data, all responses were entered into SPSS software version 28. Multivariate Analysis of Covariance (MANCOVA) was employed to analyze the scores. The significance level for testing the assumptions was set at 0.05.

Table 1. Computer-based cognitive rehabilitation program

No	Target	Content
1	Strengthening sustained attention and selective	Showing a simple schematic house, with a different color than the roof, walls, and windows, as the target house; showing multiple houses at the end; clicking on a house similar to the target house more quickly; having distracting factors and a variety of houses each time the task is presented to make it progressively more difficult.
2	Strengthening sustained attention, attention shifting, and divided attention	Emoticons descending from the top of the screen to the bottom of the screen; the ability to control the speed of descent using the computer keyboard; the presence of different features, including skin color and emotional expressions in emoticons; placing emoticons on top of each other based on practice; changing the descent of emoticons and practice rules
3	Boosting memory capacity	A table appears with some similar images hidden in it; a hidden image is revealed by clicking on any cell of the table; connecting similar images in different cells of the table
4	Strengthening working memory visual and auditory	Display new images along with duplicate images; identify duplicate images by clicking on them.
5	Strengthening visual and spatial memory	Displaying parts of an image sequentially, presenting 4 complete images; selecting cut pieces to complete the desired image
6	Phonological reinforcement and inhibitory control	Displaying several words in sequence; displaying four words to an individual; selecting the relevant word based on the headwords of the words initially displayed.

No	Target	Content
7	Strengthening the ability to update	Presenting several colored cubes to the individual in sequence; providing the individual with four choices to choose the 2 colors of the last cubes they saw
8	Spatial and Visual Enhancement Update	Show a table with a picture of an animal inside each of its boxes; show arrows with different directions; ask the person to follow the direction of the arrows and find the animal's path and location.
9	Strengthening the ability to update	Present a row of new images along with repeated images; click on the image if you see repeated images
10	Strengthening Phonology and Inhibitory Control	Showing a sequence of words or sentences to a person, asking the person to indicate how similar the last letter of one word is to the first letter of the next word.

Results

The mean and standard deviation of the age of the experimental group patients were 68.75 ± 5.39 years and for the control group patients were 69.11 ± 5.87 years. The results of the chi-square test showed that there was no significant difference between the experimental and control groups in gender, education, job, marital status, and age grouping ($P > 0.05$). The mean and standard deviation of pre-test-post-test scores of cognitive rehabilitations on cognitive distortion, depression, and life expectancy of the elderly with mild Alzheimer's in the experimental and control groups are presented in Table 2. Also in this table, the results of the Shapiro-Wilk test (S-W) are reported to check the normality of the distribution of variables in the two groups. According to this table, Shapiro-Wilk statistics is not significant for all variables. Therefore, it can be concluded that the distribution of variables is normal (Table 2).

Table 2. Descriptive Indices of Study's Variables in Control and Experimental Groups

Variables	Stage	Groups	Mean	SD	S-W	P*
Unrealistic relationship expectations	Pre-test	Experimental	29.56	1.65	0.106	0.071
		Control	29.05	1.43	0.101	0.082
	Post-test	Experimental	25.94	1.92	0.100	0.069
		Control	29.66	1.84	0.097	0.075
Interpersonal rejection	Pre-test	Experimental	31.33	1.14	0.115	0.081
		Control	30.72	1.56	0.101	0.062
	Post-test	Experimental	27.05	2.38	0.098	0.052
		Control	31.61	1.19	0.085	0.074
Interpersonal misperception	Pre-test	Experimental	10.11	0.75	0.096	0.053
		Control	9.72	1.17	0.119	0.074
	Post-test	Experimental	6.94	1.58	0.087	0.080
		Control	10.44	0.61	0.093	0.064
Depression	Pre-test	Experimental	28.72	0.95	0.088	0.061
		Control	30.05	1.39	0.092	0.057
	Post-test	Experimental	23.83	2.30	0.089	0.052
		Control	29.05	0.87	0.105	0.084
Agency thinking	Pre-test	Experimental	10.07	1.01	0.091	0.060
		Control	9.12	1.18	0.089	0.057
	Post-test	Experimental	13.55	1.58	0.095	0.071
		Control	10.11	0.90	0.114	0.084
Pathways thinking	Pre-test	Experimental	9.38	0.91	0.108	0.054
		Control	8.33	0.76	0.115	0.082
	Post-test	Experimental	12.44	1.24	0.095	0.063
		Control	9.23	0.73	0.099	0.070

*Note: Shapiro-Wilk test

MANCOVA was used to evaluate the efficacy of cognitive rehabilitation on cognitive distortion, depression, and life expectancy of the elderly with mild Alzheimer's. The results of the Levin test to examine the homogeneity of variance of dependent variables in groups showed that the variance of cognitive distortion, depression, and life expectancy were equal in the groups ($P > 0.05$). The results of the box test to evaluate the equality of the covariance matrix of dependent variables between the experimental and control groups also showed that the covariance matrix of the dependent variables is equal (Box M= 63.35, F=0.95, $P > 0.306$). The

significance of the box test is greater than 0.05, so this assumption is valid. Also, the results of the Chi-square-Bartlett test to examine the sphericity or significance of the relationship between cognitive distortion, depression, and life expectancy showed that the relationship between them is significant ($\chi^2=128.09$, $df=21$, $P<0.05$). Another important assumption of multivariate analysis of covariance is the homogeneity of regression coefficients. It should be noted that the homogeneity test of regression coefficients was examined through the interaction of dependent variables and independent variables (intervention method) in the pre-test and post-test. The interaction of these pre-tests and post-tests with the independent variable was not significant and indicated the homogeneity of regression slope; therefore, this assumption also holds. Due to the establishment of multivariate analysis of covariance, the use of this test will be allowed. Then, to find out the differences between the groups, a multivariate analysis of covariance was performed (Table 3).

Table 3. The Results of Multivariate Analysis of Covariance on Mean Post-Test Scores

Test	Value	F	df	Error df	P	Effect Value
Pillai's Trace	0.583	5.36	6	23	<0.001	0.58
Wilks Lambda	0.417	5.36	6	23	<0.001	0.58
Hotelling Trace	1.398	5.36	6	23	<0.001	0.58
Roy's Largest Root	1.398	5.36	6	23	<0.001	0.58

According to Table 3, the results showed the effect of the independent variable on the dependent variables; In other words, experimental and control groups have a significant difference in at least one of the variables of cognitive distortion, depression, and life expectancy, which according to the calculated effect size, 58% of the total variance of experimental and control groups is due to the effect of the independent variable. Also, the statistical power of the test is equal to 1, which indicates the adequacy of the sample size. However, to determine in which areas the difference is significant, a univariate analysis of the covariance test was used in the MANCOVA, the results of which are reported in Table 4.

Table 4. Results of Univariate Analysis of Covariance on the Mean of Post-Test Scores of Dependent Variables in Experimental and Control Groups

Variables	SS	SS Error	df	MS	MS Error	F	P	Effect Value
Unrealistic relationship expectations	65.14	53.16	1	65.14	1.89	34.31	<0.001	0.55
Interpersonal rejection	76.05	100.36	1	76.05	3.58	21.22	<0.001	0.43
Interpersonal misperception	49.79	45.72	1	49.79	1.63	30.49	<0.001	0.52
Depression	103.82	90.03	1	103.82	3.21	32.28	<0.001	0.53
Agency thinking	29.91	48.56	1	29.91	1.73	17.24	<0.001	0.38
Pathways thinking	23.45	27.12	1	23.45	0.96	24.20	<0.001	0.46

According to the contents of Table 4, F-statistic is significant for unrealistic relationship expectations ($F=34.31$), interpersonal rejection ($F=21.22$), interpersonal misperception ($F=30.49$), depression ($F=32.28$), agency thinking ($F=17.24$), and pathways thinking ($F=24.20$) at the level of 0.001. These findings indicate that there is a significant difference between the groups in these variables. Also, according to the calculated effect size, 55% of unrealistic relationship expectations, 43% of interpersonal rejection, 52% of interpersonal misperception, 53% of depression, 38% of agency thinking, and 46% of pathways thinking were independent of the effect of the variable; As a result, it can be stated that cognitive rehabilitation significantly decrease cognitive distortion (unrealistic relationship expectations, interpersonal rejection,

interpersonal misperception) and depression, and increases of life expectancy (agency thinking, pathways thinking) in elderly with mild Alzheimer's disease.

Discussion and Conclusion

The present study was conducted to evaluate the efficacy of cognitive rehabilitation on cognitive distortion, depression, and life expectancy in elderly individuals with mild Alzheimer's disease. Given the progressive cognitive and emotional challenges associated with this condition, interventions that target both cognitive functioning and psychosocial well-being are essential (Nissim et al., 2023). Cognitive rehabilitation, through structured exercises, strategy training, and engagement in meaningful activities, provides a comprehensive approach to supporting residual cognitive abilities while promoting adaptive emotional and behavioral outcomes (Irazoki et al., 2020).

The results of the present study indicate that cognitive rehabilitation significantly reduced cognitive distortions in elderly participants with mild Alzheimer's (Tortora et al., 2024). By engaging participants in structured cognitive exercises and guided problem-solving tasks, the intervention facilitated more accurate interpretations of daily experiences and memory lapses, reducing tendencies toward catastrophizing or overgeneralization (Rajji et al., 2020). These findings are consistent with prior research suggesting that targeted cognitive training can recalibrate maladaptive thought patterns by promoting reflective thinking and enhancing executive control. Older adults who develop alternative cognitive strategies are better able to appraise situations realistically, decreasing the influence of distorted thinking on emotional responses and decision-making. Reducing cognitive distortions has important downstream effects on overall functioning (He et al., 2022). Participants demonstrated improved confidence in managing daily routines and navigating novel situations, highlighting that cognitive rehabilitation not only addresses cognitive deficits but also fosters adaptive coping mechanisms that support psychological resilience in mild Alzheimer's populations (Perra et al., 2023).

Cognitive rehabilitation was also associated with a marked reduction in depressive symptoms among elderly participants. By improving cognitive self-efficacy and providing structured mental engagement, the intervention helped alleviate feelings of helplessness and frustration that often accompany mild cognitive impairment (Chang et al., 2022). The reduction in depression can be understood through both cognitive and psychosocial mechanisms. Enhanced cognitive control and problem-solving skills empower older adults to manage challenges more effectively, while the social interaction inherent in rehabilitation programs provides emotional support and decreases feelings of isolation (Osawa et al., 2025). This decrease in depressive symptoms has broad implications for quality of life and functional independence. Older adults who experience improved mood are more likely to engage in daily activities, adhere to treatment regimens, and maintain social connections, all of which contribute to healthier aging trajectories and reinforce the overall benefits of cognitive rehabilitation (Justo-Henriques et al., 2025).

The study further suggests that cognitive rehabilitation positively influenced aspects of a healthy lifestyle and potentially life expectancy among participants. By enhancing cognitive function, promoting adaptive problem-solving, and encouraging structured daily routines, the intervention indirectly supports behaviors associated with longevity, such as physical activity, medication adherence, and social participation. Engagement in cognitive rehabilitation also

fosters emotional resilience, which is closely linked to physiological health outcomes. Reduced stress, improved mood, and enhanced coping abilities can mitigate the negative effects of chronic inflammation and neurodegeneration, factors that are known to influence life expectancy in older adults. Overall, these findings underscore the holistic benefits of cognitive rehabilitation for elderly individuals with mild Alzheimer's disease. Beyond cognitive and emotional improvements, the intervention contributes to healthier lifestyle behaviors, greater functional independence, and potentially enhanced longevity, highlighting its value as a comprehensive approach to supporting aging populations (Kudlicka et al., 2023).

The findings of the present study collectively highlight the comprehensive efficacy of cognitive rehabilitation in elderly individuals with mild Alzheimer's disease. By targeting cognitive distortions, alleviating depressive symptoms, and fostering healthier lifestyle practices, the intervention demonstrates multidimensional benefits that extend beyond isolated cognitive improvements. These results suggest that structured cognitive engagement not only strengthens residual cognitive capacities but also promotes emotional resilience, adaptive coping, and functional autonomy, which are critical for maintaining quality of life in the context of progressive neurodegenerative decline. In a broader sense, this study underscores the importance of early, evidence-based interventions that integrate cognitive, emotional, and behavioral dimensions in aging populations. The holistic impact of cognitive rehabilitation reflects the interconnected nature of cognition, mood, and lifestyle in determining overall well-being and potentially life expectancy. Ultimately, such interventions offer a promising avenue for supporting aging with dignity, preserving independence, and mitigating the multifaceted challenges associated with mild Alzheimer's disease.

Declarations

Author Contributions

S.A.F: Conceptualization, Methodology, Formal analysis, Investigation, Writing – Original Draft, Writing – Review & Editing; N.H.B: Data Curation, Software, Validation, Formal analysis, Investigation, Writing – Original Draft, Writing – Review & Editing; L.T: Supervision, Methodology, Investigation, Writing – Review & Editing; S.J.A: Conceptualization, Methodology, Investigation, Resources, Writing – Review & Editing; V. S. N: Validation, Formal analysis, Writing – Review & Editing, Project administration.

Data Availability Statement

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

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Ethical considerations

Ethical principles in manuscript writing have been adhered to by the guidelines of the National Ethics Committee and the COPE regulations.

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Conflict of interest

The authors declare no conflict of interest in this study.

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