Research Article

Translation, Cultural Adaptation, and Content Validity of the Persian Version of the Structured Cognitive Training Program "NEUROvitalis"

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Running title:

Abstract:
Background: The older adult populations is growing worldwide, particularly in Iran, leading to a decline in cognitive functions. Cognitive training effectively enhances cognitive abilities. NEUROvitalis is a structured cognitive training program incorporating psychoeducation with individual and group cognitive tasks. It accommodates up to 8 participants aged 50 and above, spanning 12 sessions over 6 weeks. This study aims to prepare translation, cultural adaptation, and content validity of the Structured Cognitive Training Program "NEUROvitalis"
Materials and methods: To conduct this methodological study, we followed the standard forward-backward process. Then, the translation accuracy was checked by German translators, we assessed the fluency and comprehensibility of the translated material. Twelve assessors from Tehran University of Medical Sciences scored each psychoeducational component—pamphlet, group game, and individual exercise—on a 5-point visual scale. Then, the Content Validity Index (CVI) was calculated.
Results: A total of 12 participants (eight females, four males, aged 23–41, mean age 28.83 ± 6.23) took part in the evaluation of comprehensibility and fluency. CVI ranged from 0.8 to 1, indicating the successful validation of the program's comprehensibility and fluency.
Conclusion: The current study's results indicate that the Persian version of the structured cognitive training program "NEUROvitalis" can be a proper, valid, and comprehensive tool for cognitive training in Persian-speaking people aged 50 years and above.
Keywords: Cognitive Dysfunction, Cognitive Training, Aged, Cognitive Aging

Introduction:
Age-related cognitive decline is believed to be a part of the natural aging process [1]. It includes a variety of cognitive features that happened as aging affects cognitive domains such as processing speed, reasoning, memory, and executive functions. This cognitive decline can lead to Mild Cognitive Impairment (MCI) [2]. The prevalence of MCI in the older adult populations is between 3% and 19%, with an annual incidence rate of 8 to 58 cases per 1,000 persons [1]. MCI is when a person has problems with cognitive functions that are worse than what is typical for their age and education level but do not interfere with their daily life [3]. Individuals with MCI may experience changes in several domains, including memory, executive functioning, attention, language, and visuospatial skills [4, 5]. MCI is an intermediate stage between normal cognition and neurological disorders [6]. Individuals diagnosed with MCI are at an increased risk of impairment and loss of independence compared to those with normal cognition. Increasing age is strongly associated with a growing risk of MCI [7]. In fact, MCI is a significant pre-dementia state that can lead to dementia [8]. Even though not all individuals with MCI will develop to dementia, early diagnosis and intervention of MCI could potentially delay or prevent the onset of dementia [9]. Every three seconds, a new case of dementia is diagnosed worldwide [10].
Data indicates that Iran's aging trend is accelerating due to social, economic, and medical status improvements. These improvements have reduced mortality rates and increased life expectancy, enlarging the senior population and causing significant demographic shifts [11]. The older adult populations in Iran increased by more than 100% between the five censuses held from 1956 to 2006 [12]. By 2041, it is estimated that the number of seniors in Iran will reach 18 million, accounting for 26% of the total population [13]. Cognitive changes associated with aging can

cause loss of independence in older people and diminish their quality of life. Therefore, the preserving cognitive functions is paramount to a good quality of life in older adult [14].

As the population ages, improving quality of life and reducing the risk of cognitive decline in later years has become a global priority. Identifying individuals who are in the transitional stage between age-appropriate cognitive functioning and the onset of severe cognitive symptoms has become even more imperative for the earlier initiation of interventions. In other words, identifying those in the MCI stage is crucial for the initiation of cognitive intervention options as early as possible [15]. Systematic reviews have revealed that cognitive training positively effects on cognitive functions [16-18]. The evidence indicates that cognitive training in older adult with MCI can help to prevent or delay dementia [19-21]. Cognitive training is a behavioral intervention distinguished by both structured and unstructured activities planned to improve in one or more of the cognitive domains, such as memory, attention, language, and executive function [22]. Cognitive training can be delivered individually or in groups; tasks may be presented using paper and pencil or computer-based methods [23]. Examples of computer programs include: 1) Cogmed, which is used to improve working memory in individuals with MCI [24]; 2) COGPACK: works on various domains of cognition, including language, memory, reaction time, and seeing [25]; 3) COMCOG: targets various domains such as attention, memory, and higher-level thinking abilities [26]; and 4) CogniPlus: targets attention, working memory, long-term memory, and visuomotor skills [27].

One of the paper-based programs is the NEUROvitalis structured cognitive training program, a neuropsychological program for enhancing of cognitive functions, developed by Kalbe et al. in 2010 [27]. What makes NEUROvitalis unique is that it follows a structured cognitive training approach where guidelines, based on evidence, determine the structure and content of each training session. This cognitive training program encompasses psychoeducation, individual tasks, group tasks, and group games targeting specific cognitive functions [28]. It may be used in neuropsychology, speech therapy, occupational therapy, rehabilitation clinics, nursing homes, senior day care centers, and training institutions to help older adult regain their mental abilities. The program is designed for group training for up to 8 people. It can also, with slight modification, be adapted for individual training. The program consists of 12 training sessions. Each session consists of two segments lasting 50 minutes, with a 10-minute break in between. The training covers different areas of cognition, including working memory, memory skills, attention, executive functioning, visuospatial functioning, and language skills. The program's psycho-educational components help the participants learn how the brain works and how age-related brain changes can affect one's cognition, experiences, and behavior. It is unique because of its proven effectiveness, user-friendliness, participant acceptance, adaptability to everyday activities, comprehensive cognitive training, and inclusion of individual and group training. The program's effectiveness has been demonstrated in persons aged 50 years and older, with and without cognitive impairment, including those with MCI and Parkinson's disease, through randomized controlled trials [28-30]. NEUROvitalis is suitable for people who want to keep their minds working well. The program is directed at people without cognitive problems, people with brain injuries or nervous diseases—like stroke or multiple sclerosis— who are more likely to have cognitive issues and patients who already experience cognitive problems. It is also appropriate for patients who have changes in their cognitive performances because of their mental illness [31].

Numerous cognitive training programs in Iran are designed for preschoolers and school-aged children. There is currently no cognitive training program designed specifically for individuals

over 50, regardless of whether they have MCI [32-37]. Moreover, these existing cognitive programs in Iran do not offer comprehensive training in all cognitive functions; they usually focus on just one or two cognitive domains, such as memory and attention, or executive functions. Until now, NEUROvitalis has only been applied in Germany and Luxembourg. Based on searches of foreign and domestic databases, there is currently no comprehensive, structured Persian-language program specifically for people over 50 with or without MCI that addresses various cognitive domains, including working memory, memory skills, attention, executive functions, visuospatial abilities, and language skills [38]. Among the cognitive programs existing in Iran, the "Aram" program [37] is notable as it targets older individuals with MCI. However, as previously mentioned, NEUROvitalis is much more extensive than the Aram program. It is a computerized program targeting only a few cognitive domains, specifically working memory, attention, and executive functions. Additionally, it does not have age-appropriate tasks for people over 50. In contrast, NEUROvitalis has age-specific tasks and covers many cognitive domains. Table 1 lists some cognitive training programs available in Iran, including the program name, creator, year of creation, targeted cognitive domains, and target groups.

Due to the unavailability of a Persian version of the NEUROvitalis cognitive training program, developing and validating a Persian version seems essential for its introduction to the scientific community for future research on its effectiveness.

Table 1. Examples of Cognitive Training Programs Available in Iran

Row	Program Name	Creator	Target Cognitive Areas	Target Group
1	Baran [33, 34]	Najafi (2017)	Attention and executive functions based on movement (involving the whole body)	Children with Attention-Deficit/Hyperactivity Disorder, typically developing children, children with Autism Spectrum Disorder
2	Pars [35]	Najafi (2017)	Attention	Children with Attention-Deficit/Hyperactivity Disorder, children with Autism Spectrum Disorder, children with learning disabilities
3	Paria [36]	Najafi (2014)	Rehabilitation based on reverse imitation	Children with Autism Spectrum Disorder
4	Aram	Najafi	Working	Children with

	[32, 37]	(2006)	memory, attention, and executive functions through computer-based training	Attention-Deficit/Hyperactivity Disorder, children with specific language impairment, children with learning disabilities, typically developing children, older adult people with mild cognitive impairment, neurologically impaired patients with cognitive deficits

Materials and Methods:

The study was conducted using a methodological research design. Initially, the program was translated from German to Persian. Subsequently, the face and content validity of the 12 sessions of the NEUROvitalis cognitive training program were evaluated by experts in cognitive rehabilitation and training. These specialists comprised 6 speech and language pathologists with a master's degree, 2 speech and language pathologists with a doctoral degree, 2 senior experts in cognitive psychology, and 2 faculty members from the Linguistics Department of the University of Tehran. The following steps will outline this in detail.

1. Cultural adaptation and localization of the "NEUROvitalis Structured Cognitive Training Program"

1-1. Overview of translation and adaptation processes (the Forward and Back translation)

Before conducting the study, permission to translate and culturally adapt the program was obtained from the developer through email. In the first step of our study, two official translators translated the text from German into Persian. The translators were unfamiliar with the program. Two experienced speech and language pathologists with expertise in cognitive processes evaluated the translated document for clarity, linguistic fluidity, and fidelity to the original meaning. Discrepancies were resolved through discussion between the two translators. Resulting in a preliminary Persian version being prepared.

In the back translation process, two native speakers of Persian fluent in German and currently residing in Germany were asked to retranslate the Persian version into German and then compare it with the original version, highlighting all the necessary corrections. Following the comments of these two reviewers familiar with German, the Persian text was finalized. The two reviewers had different opinions, so a third translator was involved to discuss and solve the differences.

1-2. Translation and Cultural Adaptation of the Program's Implementation Manual and Educational Booklets for the "NEUROvitalis" Structured Cognitive Training Program

The "NEUROvitalis" structured cognitive training program contains 12 cognitive training sessions, while its German-language implementation manual has about 380 pages. This manual includes:

1. Instructions for implementing the program,
2. Theoretical chapters and tutorial booklets to improve participants' knowledge about the brain and its functions
3. Cognitive exercises for individual home practice and
4. Group exercises and cognitive games that can be applied during therapy sessions.

In addition, some words and expressions that did not conform to Iranian cultural values were replaced with appropriate ones during translation. For instance, referring to drinking alcoholic beverages was removed.

1-3. Translation and Cultural Adaptation of the Images Used in the "NEUROvitalis" Structured Cognitive Training Program

The "NEUROvitalis" program includes 138 images, which designed for stimulate cognition and enhance memory by encouraging recall of objects, people, and places. Additionally, also facilitate comprehension and learning. The above described procedure was applied for their translation and cultural adaptation. Following translation and revisions by two experienced speech and language pathologist in cognitive neurology, two native speakers of Persian who were also fluent in German checked the pictures for accuracy. Any image judged to be culturally inappropriate for Iranian participants was deleted and replaced with a suitable alternative.

1-4. Translation and Cultural Adaptation of Individual and Practical Exercises in the "NEUROvitalis" Structured Cognitive Training Program

The "NEUROvitalis" cognitive training program consists of 72 exercises and 14 practical ones. These exercises are designed for implementation in a center or home environment and aim to enhance cognitive functioning. Within the practical exercises, theoretical content from educational booklets is consolidated by hands-on activities contextualized through appropriate examples from everyday reality. The individual exercises are cognitive tasks related to topics discussed in the theoretical sections and are conducted independently at home. Answer sheets are provided for individual exercises to evaluate participants' responses.

The exercise instructions and associated images were first translated as described earlier for the translation and cultural adaptation of individual exercises. Then, translating the exercises' vocabulary, sentences, and passages was based on the criteria and goals used by the program's designers in choosing the elements mentioned above. Based on these criteria and considering linguistic and psychological characteristics such as word frequency and the number of syllables in German, appropriate vocabulary, sentences, and texts were chosen and translated into Persian. The translations were sent to two experienced speech and language pathologists, specialists in cognitive rehabilitation, for review. After receiving their feedback, the translations were sent to two Persian-German bilinguals, one living in Germany, who were familiar with both languages' word frequency and syllable structure, for review and revision.

Finally, the translations were sent to a member of the linguistics department at Tehran University to examine semantic, phonological, and syntactic consistency, and their comments were incorporated into the final draft.

1-5. Translation and Cultural Adaptation of Group Games in the "NEUROvitalis" Structured Cognitive Training Program

The "NEUROvitalis" program comprises five group activities designed to train cognitive functions in community-based centers. To begin with, the instructional text was translated as described above for these group activities' translation and cultural adaptation. This was followed by the translation and cultural adaptation of the exercise images used in the exercises. Subsequently, the translation of words and sentences of the group games followed the same methodology used for individual and practical exercises.

2. Evaluation of the Comprehensibility and Fluency of the Translated Text

Following approval of the translated content by translators living in Germany to accuracy, the comprehensibility and fluency of the translated text were examined. To do this, eight speech and language pathologists (six at the master's level and two at the doctoral level), two master's level cognitive psychology experts, and two faculty members from the linguistics department evaluated the.

A five-point visual scale was used to test the fluidity and clarity of each component—educational resources, booklets, group games, and individual exercises—. For comprehensibility, a score of 5 meant that the text was "completely comprehensible," 4 meant "very good comprehensibility," 3 meant "moderate comprehensibility," 2 meant "limited comprehensibility," and 1 indicated "not comprehensible at all." For fluency, a score of 5 meant "completely fluent text," 4 indicated "very good fluency," 3 meant "moderate fluency," 2 meant "limited fluency," and 1 meant "not fluent at all."

The evaluation instrument was distributed to speech and language pathologists, master's level students in cognitive psychology, and two faculty members in the linguistics department to evaluate the comprehensibility and fluency of the translated text. Excerpts from the program were randomly selected and sent to the evaluators: the implementation guidelines, theoretical frameworks, educational booklets, individual tasks, practical assignments, group activities, and games. Participants were asked to evaluate the comprehensibility and fluency of the translated material based on the above criteria.

A Content Validity Index (CVI) was used to evaluate the clarity and linguistic fluency of the text. Wherever unintelligible words or syntactic structures were found, the translated document was accordingly revised.

Results

The current research first translated the text of the "NEUROvitalis" cognitive training program from German into Persian and then vice versa. Finally, words, sentences, and images deemed appropriate were selected. The cultural adaptation of images is summarized in Table 2, the cultural and linguistic changes of words are presented in Table 3, and the cultural and linguistic modifications of sentences and texts are detailed in Table 4.

Table 2. Cultural Adaptation of Images

Row	Description of Original Image	Description of Replaced Image	Cognitive Training Session Number

1	Image of stretching exercises performed by a woman	Image of stretching exercises performed by a man	Session 2
2	German alphabet	Persian alphabet	Session 3
3	Map of walking to the church	Map of walking to the mosque	Session 8
4	Visual memory exercise with images of women	Visual memory exercise with images of men	Session 10
5	Image of Dr. Ursula Lehr	Image removed due to inappropriate veil	Session 12
6	Image of a cathedral	Image of a holy shrine	City map game
7	Image of a neighborhood church	Image of a mosque	City map game

Table 3. Cultural and/or Linguistic Adaptation of Words

Row	**Literal Translation of the German Word into Persian**	**Replaced Word in Persian**	**Reason for Replacement**
1	Dance	Rhythmic Movements	Contradiction with Iranian-Islamic culture
2	Lightbulb bubble	luster	Low frequency of the word in Persian and the compound nature of the Lightbulb bubble in Persian, while the original German word is not compound
3	Cycling tour	Travel tour	Cycling tours are common in Europe but not in Iran
4	Red	پ و ت	Due to the content of the exercise requiring the letters to be read from left to right, the letters "پ و ت" were chosen, forming the word /Toop/

			(Ball) when read from left to right
5	New	ف ی ل	For the content of the exercise, where the letters must be read from both right to left and left to right and make sense in both directions, the letters "ف ی ل" were chosen, forming /fil/ (Elephant) when read from left to right and /lif/ (Towel) when read from right to left
6	Sugar	د ا م ا د	Considering the content of the exercise, which required letters to be read both from right to left and left to right to form meaningful words, the letters "د ا م ا د" were chosen. This selection ensured that the resulting word, /damad/ (Groom), remained the same and meaningful when read in both directions.
7	Poppy	Chocolate	Contradiction with Iranian-Islamic culture
8	Mistletoe	Poplar tree	Low frequency of mistletoe in Iran
9	Beech tree	Pine tree	Low frequency of beech tree in Iran
10	Fir tree	Sycamore tree	Low frequency of fir tree in Iran
11	German names	Persian names	No German names in Persian language
12	German surnames	Persian surnames	No German surnames in Persian language
13	Names of Gregorian months	Names of Persian months	The official calendar of Iran is the Solar Hijri calendar
14	Compound German words	Compound Persian words	In some exercises, a simple word is given and the person has to provide a derived word or another simple word that combines to form a new compound word. Due to structural differences between German and Persian, the words were changed
15	German prefixes and	Persian prefixes	In some exercises, a simple word is given and the person has to create a

	suffixes	and suffixes	new word by adding the appropriate prefix or suffix. Due to structural differences between German and Persian, the words were changed

Table 4. Cultural and/or Linguistic Adaptation of Sentences and Texts

Row	Literal Translation of the German Sentence into Persian	Replaced Sentence in Persian	Reason for Replacement
1	Benefits of alcohol consumption for heart health	Removal of the entire related text	Contradiction with Iranian-Islamic culture
2	Text about the German Art Museum	Text about the National Museum of Iran	Due to the exercise requiring memorization of the text, the replacement text was chosen for its cultural similarity
3	Text about a forest park in one of the cities in Germany	Text about Golestan National Park	Due to the exercise requiring memorization of the text, the replacement text was chosen for its cultural similarity
4	German proverbs	Persian proverbs with the same meaning	Use of Persian proverbs

Various parts of the program were randomly given to experts in geriatric rehabilitation to evaluate the understandability and flow of the Persian version of the "NEUROvitalis" structured cognitive training program. The expert committee consisted of six speech and language pathologists at the master's level, two speech and language pathologists at the doctoral level, two cognitive psychology specialists at the master's level, and two linguistics faculty members. The panel consisted of eight females and four males, aged between 23 and 41 years, with an average age of 28.83 years (SD = 6.23). All participants had graduate-level education, and 66.6% had experience related to therapy in cases of cognitive impairments. Demographic details of the participants are depicted in Table 5.

Table 5. Demographic Characteristics of Participants in the First Phase of the Study to Assess the Comprehensibility and Fluency of the Translated Text

	Frequency (Percentage)
Gender	
Female	8 (66.7%)
Male	4 (33.3%)
Field of Study	
Speech Therapy	8 (66.7%)
Cognitive Psychology	2 (16.7%)
Linguistics	2 (16.7%)
Education Level	
Master's Degree	8 (66.7%)
Doctorate	4 (33.3%)
History of Cognitive Injury Treatment	
Yes	8 (66.7%)
No	4 (33.3%)

The content validity of the Persian version of the "NEUROvitalis" program was checked using the CVI. Participants were asked to grade the comprehensibility and fluency of the following program components by giving a grade from 1 to 5 for each one:

1. Theoretical content,
2. Educational booklets,
3. And Program exercises (individual, practical, and group exercises).

In the CVI, scores attributed to the items across the two criteria of comprehensibility and fluency varied between 0.8 and 1. Therefore, the comprehensibility and fluency of different program parts were confirmed. The results obtained from the content validity assessment for the "NEUROvitalis" structured cognitive training program are shown in Table 6.

Table 6. Content Validity Index (CVI) Evaluation for the Structured Cognitive Training Program "NEUROvitalis"

Relevant Section	CVI Value	Result

Comprehensibility of Text		
Theoretical Section	0.83	CVI is acceptable
Handouts Section	1.00	CVI is acceptable
Exercises Section	0.91	CVI is acceptable
Fluency of Text		
Theoretical Section	0.83	CVI is acceptable
Handouts Section	0.83	CVI is acceptable
Exercises Section	0.91	CVI is acceptable

In validating the Persian adaptation of the "NEUROvitalis" cognitive training program, several cultural and linguistic adjustments were made to ensure acceptance among Persian-speaking people. Changes were made to the images used in the program. For instance, the images of stretching exercises in the original version were altered to meet Iranian cultural norms. Accordingly, images of religious places of worship, such as churches, were replaced by images of mosques to make them relevant to the cultural and religious background of the Persian-speaking participants. Moreover, in cognitive exercises Persian letters replaced German letters and participants had to arrange letters alphabetically. Appropriate pictures or pictures of males replaced pictures of female subjects dressing inconsistently with Iranian cultural norms. Further changes were also made in sentences and training materials. Information at variance with Iranian-Islamic cultural norms, such as the benefits of alcohol consumption to prevent cardiovascular disease, was removed. Exercises regarding the National Museum of Iran and Golestan National Park replaced pictures and information about the German Art Museum or a forest park in Germany since the former were culturally more relevant for Persian speakers. When the cognitive exercises required memorizing specific text, the replacement text was selected in cooperation with the program's original developers, experts, and cognitive experts to retain the structure and number of words while changing its content. Moreover, Persian proverbs were substituted for German ones, which conveyed the same meanings promoted the understanding of psycho-educational principles.

All cultural and other sensitive German terms and expressions without their exact Persian translations or which did not correspond to the cultural appropriateness of Iranian culture were replaced. For example, "dance" was replaced with "rhythmic movements" in conformity with Iranian culture. Similarly, phrases such as "bicycle tour" were changed to "travel tour," and the names of species of trees less common in Iran were replaced with those well known to Iranians. German names, surnames, and months of the Gregorian calendar for which equivalent terms do not exist in Persian were replaced by their Persian equivalents. For instance, "German names" were changed to "Persian names," "German surnames" to "Persian surnames," and "Gregorian months" to "Persian calendar months."

In some cognitive tasks, the subjects were given a base word and were asked to add appropriate prefixes or suffixes or combine them with another base word to form either a compound or a derived word. Due to structural differences between German and Persian, these words were adapted. For exercises that required participants to read letters in reverse order and form

meaningful words, the letters "T and P" substituted for "red" to form the word /toop/ (Ball) in Persian when reversed. All these changes were made in collaboration with the original program developers, experts, and cognitive researchers.

Discussion

This study aimed to translate and validate the "NEUROvitalis" structured cognitive training program into Persian in response to the growing need for cognitive interventions developed to meet the growing older adult populations in Iran. The findings showed that the Persian "NEUROvitalis" structured cognitive training program had satisfactory face validity and translation quality. More specifically, the understandability and fluency of the translated elements of the program were checked by the Content Validity Index (CVI).

It should be noted that the current study was designed to present the Persian version of the "NEUROvitalis" cognitive training program, and hence, content validity was not assessed separately. Cultural and linguistic adaptation was found to be an essential component of this study for maintaining the program's validity. Moreover, the involvement of experts from various fields during the validation process increased the reliability of the translation and validation studies.

The "NEUROvitalis" program offers a comprehensive approach to beings of 50 years and above, irrespective of MCI status. It covers several cognitive domains during its 12 group sessions. This program also involves a lifestyle change promotion with nutritional and physical activity recommendations to maintain and enhance cognitive function. Cognitive exercises, physical activities, social interactions, nutrition counseling, and lifestyle support are combined in the program [31].

In contrast to existing Persian-language cognitive intervention programs, which generally focus on particular cognitive areas such as attention, working memory, and executive functions, "NEUROvitalis" offers an extensive training regimen that encompasses a range of cognitive domains, including working memory, learning, memory skills, attention, executive functions, visuospatial skills, and language [31-37]. Moreover, "NEUROvitalis" offers structured cognitive training and is appropriate for individual and group settings, whereas most of the programs available in Persian are only designed for individual use [32-37]. One of the unique features of "NEUROvitalis" is that every session includes a psychoeducational component through which participants receive information about brain functioning, aging-related changes, and their consequences for cognition and behavior. In this way, understand cognitive problems better. It has also demonstrated its effectiveness, user-friendliness, and popularity with participants, making its usage acceptable in daily activities [31].

Unlike "NEUROvitalis," many non-Persian cognitive training programs such as Lumosity, CogniFit, Cogmed, and Happy Neuron are not as comprehensive. For instance, programs usually lack specific exercises that target the normal age group over 50 or subjects with MCI. In addition, they lack factors like physical exercises, social interactions, dietary guidance, and lifestyle management [39-42]. Programs like Lumosity, CogniFit, and Happy Neuron are designed to target a broad age group, both adults and children [39-42]. Since these programs are not focused on the specific cognitive challenges faced by individuals aged 50 years and older, they may not effectively address the unique needs of this age group.

One of the distinctive features of "NEUROvitalis" is its strong psycho-educational elements, which provide participants with extensive knowledge about cognitive processes and health behavior. In contrast, most programs such asLumosity and CogniFit, provide limited educational

content and focus on cognitive training rather than education [43, 44]. Programs like Happy Neuron offer a mix of educational material on brain health and cognitive exercises, but the breadth of their educational content is far smaller than that of "NEUROvitalis" [45]. Similarly, Cogmed has limited educational content and focuses primarily on cognitive training [42]. Furthermore, other programs, like the Mentally Fit Program [28] and the Brain Jogging Program [46], are unstructured, presenting cognitive activities randomly in groups or individually without any training component. This contrasts the structured, comprehensive approach of "NEUROvitalis."

The CVI index was finally used to check the intelligibility and fluency of the Persian version. While evaluating content validity, experts analyzed three parts—the theoretical section, the handouts section, and the exercises section—and provided their comments regarding clarity and fluency. The information obtained from these comments ultimately led to the approval of the program's content. The results indicated that the text, images, and exercises adjustments positively enhanced the overall quality of the Persian program adaptation, which positively affected understanding and usage. These findings confirm that the Persian adaptation of the program meets the cognitive training and cultural needs of Persian-speaking individuals with both content suitability and validity.

TO conclude, the study aimed to develop and establish the Persian version of the NEUROvitalis cognitive training program. Accordingly, a Persian adaptation of the structured cognitive training program "NEUROvitalis" is an appropriate, valid, and complete tool in cognitive training among Persian-speaking subjects over 50 regardless of MCI presence or absence. This validation is important in light of the increasing prevalence of age-related cognitive decline. Cognitive training programs, like "NEUROvitalis," may potentially improve cognitive functions or delay further cognitive decline and thus improve the quality of life and independence of individuals over 50. The present study can form the basis for future research into the effectiveness of the Persian version of the standardized cognitive training program "NEUROvitalis."

Ethical Considerations

This research was done in compliance with the existing ethical standards and international protocols in human studies. Since there was no direct interaction with the subjects, informed consent was unnecessary. But permission to translate and culturally adapt the program was obtained from the original developer, thereby fulfilling the ethics component.

Given the unique needs of older adults as well as Iran's cultural realities, attempts were made to tailor the content and assessment procedures so that they are linguistically, conceptually, and practically suitable for this population. Furthermore, all cultural and linguistic changes were conducted with due attention to the country's social and cultural norms, thereby ensuring program applicability to Persian-speaking populations.

This present research received ethical approval from Tehran University of Medical Sciences Ethics Committee and was granted with the code IR.TUMS.MEDICINE.REC.1401.276.

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