



Elena Belovol,
Zlata Boyko

The Influence of “Third Age” Person’s Education on Cognitive Aging and Psychological Well-Being¹

Aging is a fundamental biological process that is inseparably linked with the genetic makeup and metabolic workings of the organism and at the same time is sensitive to environmental influences [8, 12, 1]. In literature, words “old age” and “aging” are often used as close synonyms to describe conditions and processes that can be individual or societal [15]. However, unlike people, societies can become younger, but a person ages over his life course.

Transformations of the aging body are obvious: face becomes wrinkled, the hairs turn white, the steps become heavy and body shape becomes fuzzy. Man becomes ailing, his character changes. Even ancient philosophers noticed significant age transformations. More than two thousand years ago, in his work *An Essay on Old Age*, Cicero wrote: “When

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I consider the several causes which are usually supposed to constitute the infelicity of old age, they may be reduced, I think, under four general articles: it incapacitates a man for acting in the affairs of the world; it produces great infirmities of body; it disqualifies him for the enjoyment of the sensual gratifications; and it brings him within the immediate verge of death." [21]. In Plato's *Republic*, it is also noted that most of the elders complain about their old age, but he puts their troubles down not to old age but to their character [20].

Thus, external obvious signs of aging are described and have been studied over centuries [16, 19]. Aging of cognitive functions is not so obvious [13, 14]. Even Aesculapius and his associates did not find the brain and higher cognitive functions sufficiently important to be included in the list of geriatric troubles [2]. Cognitive aging became an issue of researches in the past three decades of the 20th century. A number of theoretical notions, theories, researches and even new research topics have been suggested. The results of researches have been periodically surveyed and summarized but the results sometimes are partial and contradictory. Although there are numerous studies confirming that different kinds of occupational activity improved successful aging and psychological well-being, less is known about the influence of regular university education on cognitive aging [17, 18]. The goals of the current study was twofold. The first one was to examine the role of elderly adults' education in cognitive aging. The second goal was to investigate the influence of education on person's well-being.

Method

Participants

Older adults ($N=37$) aged 51-63 ($M=57,6$) took part in the research. All respondents were students of a special educational program "Practical psychology". Duration of the program is 2,5 years. All students have first higher education in economy, engineering, education etc. None of them has psychological education and this is a key moment for our program. Thus, psychology was a new sphere for these adults.

Task and materials

The *Worry Domains Questionnaire* (WDQ) was used to study worry across five domains in everyday activity: relationships, lack of confidence, aimless future, work, and financial issues. WDQ consists of 25 items with five point Likert scale [9]. The Questionnaire was adapted for Russian-speaking sample; its psychometric properties were verified, its factorial

structure was confirmed.

The *Metacognitions Questionnaire* (MCQ-30) was used to study the range of metacognitive processes and metacognitive beliefs about worry [10]. The questionnaire consists of five subscales, three of which assess beliefs, including:

- Positive beliefs about worry (*Worrying helps me cope*);
- Negative beliefs about worry (*My worrying is dangerous for me*);
- Cognitive confidence (*I do not trust my memory*);
- A need to control thoughts (*I should be in control of my thoughts all of the time*);
- Cognitive self-consciousness (*I pay close attention to the way my mind works*).

Four-point Likert response scale: 1 (do not agree); 2 (agree slightly); 3 (agree moderately); 4 (agree very much) is used. Russian version of the Questionnaire demonstrates good psychometric properties (satisfactory internal consistency and convergent validity, and had a good test-retest reliability). Confirmatory factor analysis affirmed its five-factor solution.

Three different procedures were used for cognitive abilities measurement. The Embedded Figures Test (EFT) measures perceptual style and analytical ability. The test requires finding simple forms which are embedded in larger figures. The score is the average time in seconds to detect the forms or the number of forms correctly identified. Longer completion times reflect poorer performance in analyzing a part separately from a wider pattern [11]. An example of task is presented at Fig.1.

Cognitive flexibility, the ability to switch from one behavioral strategy to another, was measured by means of Stroop Color and Word Test. Test is applicable for those between the ages of 15 and 90; is quick and easy in administration; and remains a standard measure

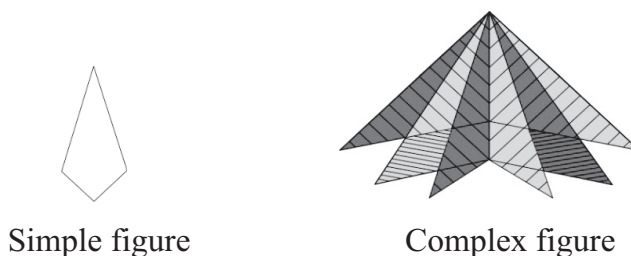


Fig 1. Example of a task from The Embedded Figures Test

in neuropsychological assessment. It assesses cognitive processing and provides valuable diagnostic information on brain dysfunction, cognition, and psychopathology.

The Stroop Color and Word Test is based on the observation that individuals can read words much faster than they can identify and name colors. The Stroop Color and Word Test consists of a Word Page with color words printed in black ink, a Color Page with 'Xs' printed in color, and a color-Word Page with words from the first page printed in colors from the second page (the color and the word do not match). The respondent goes down each sheet reading words or naming the ink colors as quickly as possible within a time limit. The test yields three scores based on the number of items completed on each of the three stimulus sheets. An Interference score, which is useful in determining the individual's cognitive flexibility, creativity, and reaction to cognitive pressures also can be calculated. A stopwatch is required to administer each test. An example of test's stimuli is presented at Fig. 2.

<i>Stimulus 1</i>	RED BLUE YELLOW GREEN
<i>Stimulus 2</i>	XXX XXX XXX XXX
<i>Stimulus 3</i>	RED BLUE YELLOW GREEN

*The task is **to name colour** of the word*

Fig. 2. Examples of the three stimuli of Stroop test.

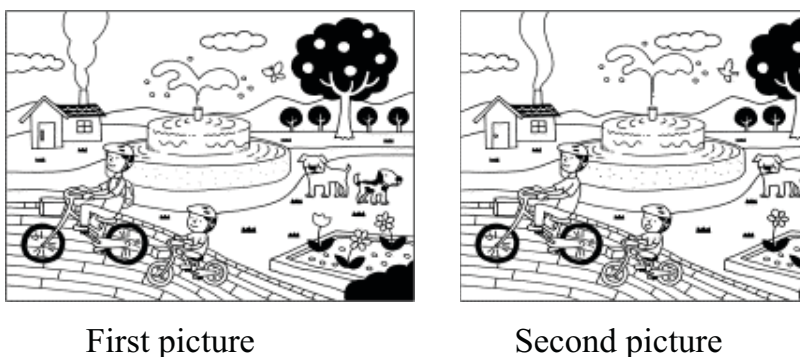


Fig. 3. Stimuli for the Spot the Difference for Cognitive Decline (SDCD) test

For memory assessment the Spot the Difference for Cognitive Decline (SDCD) test was used. The test was elaborated by a group of Japanese scientists and proved its accuracy for the identification of cognitive impairment in older adults [7]. Two pictures are used as stimuli: the “first picture” and the “second picture.” There are 10 differences between the two pictures and participant’s task is to report about differences between the first and the second pictures. The number of correct answers is the SDCD score. Pictures are presented at Fig. 3.

Two above described questionnaires and three experimental tasks were presented to the participants at the beginning of their education; at the end of first term and at the end of second term (their education is not finished at the moment).

Results

For items of The *Worry Domains Questionnaire* summary statistics are presented in Table 1 and Fig. 4.

Table 1.
Summary Statistics for Worry Domains Questionnaire scales

	<i>Average</i>	<i>Standard deviation</i>
<i>Relationships</i>	14,59	4,14
<i>Lack of confidence</i>	15,67	4,27
<i>Aimless future</i>	14,32	3,75
<i>Work</i>	11,08	3,75
<i>Financial</i>	9,45	4,37
<i>Total worry</i>	65,13	9,46



Fig. 4. Comparative analysis of subscales’ means at the beginning of the term

The results show, that our respondents are not confident in their abilities, they consider their future as aimless and they are not sure in their relations. Financial and work issues are not so important for them. The total worry score above 65 indicates that people have problems and even are chronic worries [5]. So we can conclude that upon the whole they worry much enough about their life and therefore, they are rather anxious because worry is considered as the principle component of anxiety disorders and depression [3]. It is impossible to imagine a person with high level of worry and with high level of well-being. Worry is a major detractor from well-being.

By means of *Metacognitions Questionnaire* causes of this worry were revealed. The result are presented at Fig. 5.

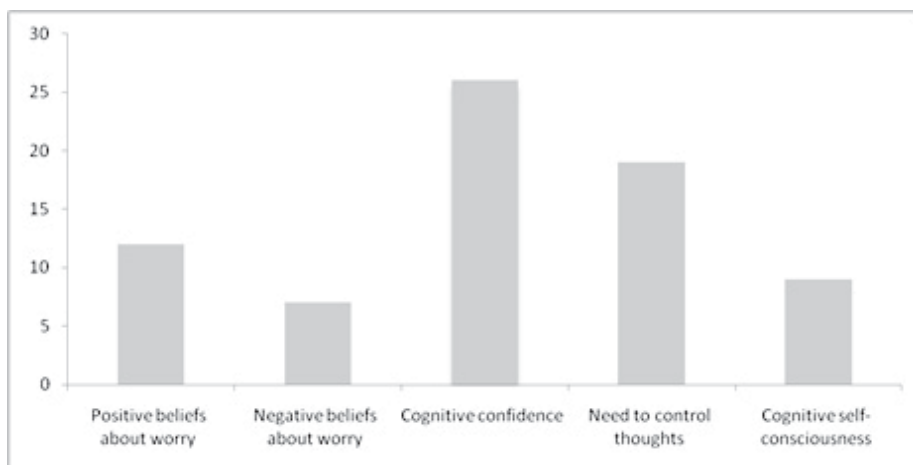


Fig. 5. Histogram of causes of worry

Cognitive incompetence is the main sphere of worry for participants. They acknowledge the necessity to control their thoughts constantly as well. Other spheres are not so important. Thus, at the beginning of education, elderly students worry much and the main sphere was the sphere of cognitive functioning.

By means of The Embedded Figures Test (EFT), The Stroop Color and Word Test and the Spot the Difference for Cognitive Decline (SDCD) test peculiarities of cognitive functioning was studied. We use these results later on.

Summarizing the results of the first stage of research it can be concluded that participants of educational program were rather anxious and unsure of themselves, with cognitive sphere being the main.

The second stage of the research was conducted at the end of their first term. The same tests' battery was given. The results of comparative analysis indicate that the total level of worry decreased, as well as worries in different domains. The results of comparative analysis are presented in Table 2 and at Fig. 6.

Table 2.

Means and Comparative analysis of worry domains

Domain	Mean (1 stage) Beginning of education	Mean (2 stage) End of the 1-st term	Mann-Whitney W test
<i>Relationships</i>	14,59	10,40	-314,5 *
<i>Lack of confidence</i>	15,67	7,29	275,5*
<i>Aimless future</i>	14,32	7,56	-561,0*
<i>Work</i>	11,08	9,18	-170,0
<i>Financial</i>	9,46	9,723	27,0
<i>Total worry</i>	65,14	44,18	-621,0*

* denotes a statistically significant difference, $p \leq 0,01$

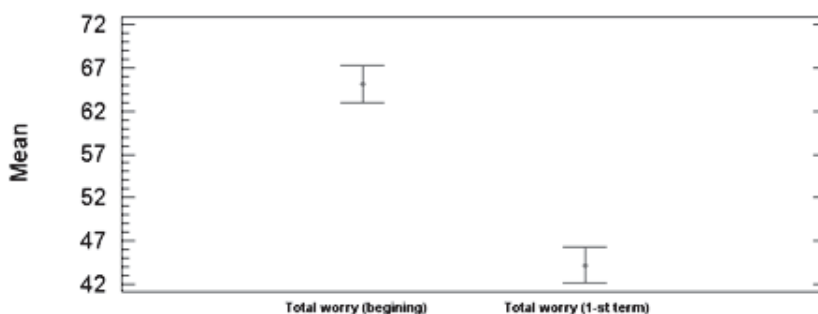


Fig. 4. Comparative analysis of subscales' means at the beginning of the term

At Fig. 7 the results of comparative analysis of causes of worry are presented.

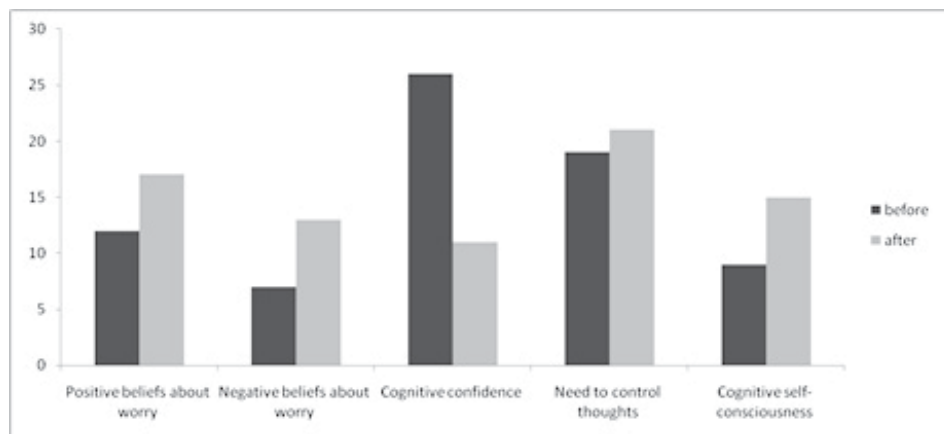


Fig. 7. Histogram of causes of worry

The most significant result of this comparison indicates striking decrease in cognitive confidence. Our participants became surer in their cognitive abilities after five month of regular learning. The most surprising thing is that their real cognitive functioning did not change. Their cognitive abilities, cognitive flexibility and visual memory remained just the same. No significant differences were revealed in the tasks' indices.

As the result of worry decreasing, the participants became less anxious, less depressive, and improved their relationships, considered future not so aimless and became confident in their abilities, especially in cognitive ones. So psychologically they feel themselves better and their subjective well-being increased.

As for cognitive functioning, real improvement was recorded only by the end of the second term of learning. Multiple Range Tests were used to determine which means are significantly different from which others. The results are presented in Table 3.

Students improved their cognitive abilities – the number of right answers in EET test increased significantly. They became more flexible – index of interferential decreased significantly. Their memory became more infallible – the number of correctly identified differences increased significantly.

Table 3.
Multiple Range Tests

<i>Contrast</i>	<i>Sig.</i>	<i>Difference</i>	<i>+/- Limits</i>
EET_before - EET_1st_term		-0,27027	0,561114
EET_before - EET_2_term	*	-2,24324	0,561114
EET_1st_term - EET_2_term	*	-1,97297	0,561114
flexibility_before - flexibility_1st_term		-1,08108	5,1238
flexibility_before - flexibility_2_term	*	25,7568	5,1238
flexibility_1st_term - flexibility_2_term	*	26,8378	5,1238
memory_before - memory_1st_term		-0,162162	0,699107
memory_before - memory_2_term	*	-1,62162	0,699107
memory_1st_term - memory_2_term	*	-1,45946	0,699107

* denotes a statistically significant difference, $p \leq 0,01$

Discussion

The current data and analyses confirms the authors' hypothesis that regular education of elderly people can improve their psychological health, and thereby, improve person's subjective well-being. They select a new goal, organize their lives around the achievement of the goal. They had to visit lectures, read special literature, fulfill practical tasks, and conduct scientific researches – so they had to optimize their efforts toward their goal by using their own resource and asking for the help of others. Some researches consider the orchestration of this processes to be central in achieving adaptive mastery and continued lifelong development [4,6]. Thus, the results of the research reveal the possibilities of enhancement of life satisfaction among those whose age is 55+ through participation in regular education.

Moreover, obtained results confirmed the hypothesis that regular fulfilling of various cognitive tasks can improve cognitive functioning of the elders: our participants improved their cognitive abilities – became more flexible, their memory became more infallible. It looks like it helps to slowdown the cognitive aging and may be a step towards coping with age.

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Authors

Elena Belovol

*PhD, professor, developmental psychology
chair, MSPU, Moscow, Russia
e-mail: belovol@mail.ru*

Zlata Boyko

*PhD, assistant professor, nursing
management chair, PFUR, Moscow, Russia
e-mail: boikozv@yandex.ru*

*Abstracts***ОЛЕНА БЄЛОВОЛ, ЗЛАТА БОЙКО. Вплив «третього віку» учнів на когнітивне старіння та психологічне благополуччя.**

У роботі розглянуто вплив стандартної освіти на психологічне благополуччя і когнітивне старіння літніх осіб. У лонгitudному дослідженні взяло участь 37 дорослих віком 51-63 років. Усі вони брали участь в програмі додаткової професійної освіти «практична психологія». За результатами навчання тільки впродовж одного семестру, значимі зміни було виявлено як у сферах, що тривожать учасників дослідження, так і у їхньому змісті. Попри те, що когнітивна некомпетентність до кінця першого семестру перестала турбувати учасників проекту, значимими об'єктивними змінами в когнітивних процесах суб'єктивно відчутне поліпшення не супроводжувалося. Значимі зміни у бік поліпшення когнітивного функціонування було відмічено тільки наприкінці другого семестру навчання. Результати дослідження дозволяють припустити можливість уповільнення і навіть поліпшення когнітивного функціонування літніх людей у процесі регулярної освіти.

Ключові слова: літні люди, навчання літніх людей, психологічне благополуччя, когнітивне старіння, когнітивне функціонування.

JELENA BIEŁOWOŁ, ZŁATA BOJKO. Wpływ „trzeciego wieku” studentów na kognitywne starzenie się i pomyślność psychologiczną. Tematem niniejszej pracy jest wpływ edukacji standardowej na pomyślność psychologiczną i kognitywne starzenie się osób w późnym okresie dorosłości. W badaniu przeprowadzonym z użyciem strategii porównań podłużnych wzięło udział 37 osób dorosłych w wieku od 51 do 63 lat. Wszystkie one uczestniczyły w programie dodatkowego kształcenia zawodowego „praktyczna psychologia”. W rezultacie odbytych szkoleń już w trakcie pierwszego semestru znaczące zmiany zostały stwierdzone zarówno w sferach, które niepokoiły uczestników badań, jak i w ich treści. Pomimo tego, że kognitywna niekompetentność pod koniec pierwszego semestru przestała niepokoić uczestników projektu, subiektywnemu odczuciu poprawy nie towarzyszyły znaczące obiektywne zmiany w procesach kognitywnych. Znaczące zmiany prowadzące do polepszenia kognitywnego funkcjonowania osób w starszym wieku podczas regularnej edukacji.

Słowa kluczowe: osoby starsze, kształcenie osób starszych, pomyślność psychologiczna, kognitywne starzenie się, kognitywne funkcjonowanie

ЕЛЕНА БЕЛОВОЛ, ЗЛАТА БОЙКО. **Влияние «третьего возраста» учащихся на когнитивное старение и психологическое благополучие.** В работе изучается влияние стандартного образования на психологическое благополучие и когнитивное старение пожилых лиц. В лонгитюдном исследовании приняло участие 37 взрослых в возрасте от 51-63. Все они участвовали в программе дополнительного профессионального образования «практическая психология». В результате обучения только в течение одного семестра значимые изменения были выявлены как в сферах, тревожащих участников исследования, так и в их содержании. Несмотря на то, что когнитивная некомпетентность к концу первого семестра перестала беспокоить участников проекта, однако значимыми объективными изменениями в когнитивных процессах субъективно ощущаемое улучшение не сопровождалось. Значимые изменения в сторону улучшения когнитивного функционирования были отмечены только в конце второго семестра обучения. Результаты исследования позволяют допустить возможность замедления и даже улучшения когнитивного функционирования пожилых людей в процессе регулярного образования.

Ключевые слова: пожилые, обучение пожилых, психологическое благополучие, когнитивное старение, когнитивное функционирование.

ELENA BELOVOL, ZLATA BOYKO. **The influence of “third age” person’s education on cognitive aging and psychological well-being.** The influence of standard regular education of elderly adults (aged 55+) on psychological well-being and cognitive aging is studied. The hypothesis that education can slow down the process of cognitive aging has been verified. By the example of a longitudinal study, the dynamics of worry domains, their content as well as cognitive functioning improvement have been studied.

Key words: elderly adults, education, psychological well-being, cognitive aging, cognitive functioning.