

Дмитрий Леонидович СПИВАК / Dimitry SPIVAK | Нэлли Леонидовна САМУС / Nelli SAMUS | Андрей Генрихович ЗАХАРЧУК / Andrey ZAKHARCHUK | Ирина Михайловна СПИВАК / Irina SPIVAK

| Психологические аспекты восприятия традиционной музыки пожилыми людьми и их мозговые корреляты. Статья 1. Психологические аспекты / Psychological Effects of Perception of Traditional Music by Elderly Persons and their Brain Correlates. Article 1. Psychological Effects |

Дмитрий Леонидович СПИВАК / Dimitry SPIVAK

*Российский НИИ культурного и природного наследия им. Д. С. Лихачева, Россия
Руководитель Центра фундаментальных исследований в сфере культуры
Ведущий эксперт Института мозга человека им. Н. П. Бехтерева Российской Академии Наук (ИМЧ РАН), Россия
Доктор филологических наук*

*D. S. Likhachev Russian Institute of Cultural and Natural Heritage, Russia
Head of Center for Basic Studies in the Sphere of Culture
Human Brain Institute, Russian Academy of Sciences, St. Petersburg, Russia
Principal Research Fellow, Doctor of Sciences in Philology
d.spivak@mail.ru*

Нэлли Леонидовна САМУС / Nelli SAMUS

*ФГБУЗ «Санкт-Петербургский Дом-пансионат ветеранов науки Российской академии наук», Санкт-Петербург, Россия
Директор, кандидат медицинских наук, врач высшей категории
Federal Budgetary Health-Care Institution 'Saint Petersburg Boarding House of Veterans of Science of the Russian Academy of Sciences',
Saint Petersburg, Russia
Head, Ph.D. in Medical Sciences
samus.nelli@yandex.ru*

Андрей Генрихович ЗАХАРЧУК / Andrey ZAKHARCHUK

*Военно-Медицинская Академия им. С. М. Кирова, Санкт-Петербург, Россия
Преподаватель 2-ой кафедры терапии усовершенствования врачей, кандидат медицинских наук
Санкт-Петербургское Государственное казенное учреждение здравоохранения Хоспис №1
Заведующий выездной патронажной службой
S. M. Kirov Military Medical Academy, St. Petersburg, Russia
Lecturer, PhD in Medical Sciences
St. Petersburg State Institution of Healthcare – Hospice No. 1
a.g.zaharchuk@gmail.com*

Ирина Михайловна СПИВАК / Irina SPIVAK

*Институт цитологии Российской академии наук (ИНЦ РАН), Санкт-Петербург, Россия
Старший научный сотрудник, кандидат биологических наук
Санкт-Петербургский государственный университет, биологический факультет, доцент
Санкт-Петербургский государственный политехнический университет, кафедра медицинской физики, доцент
Institute of Cytology, Russian Academy of Sciences, St. Petersburg, Russia, Senior Research Fellow
St. Petersburg State University, Faculty of Biology, Associate Professor
St. Petersburg State Polytechnical University, Chair of Medical Physics, Associate Professor, PhD in Biology
irina_spivak@hotmail.com*

**ПСИХОЛОГИЧЕСКИЕ АСПЕКТЫ ВОСПРИЯТИЯ ТРАДИЦИОННОЙ МУЗЫКИ
ПОЖИЛЫМИ ЛЮДЬМИ И ИХ МОЗГОВЫЕ КОРРЕЛЯТЫ.
СТАТЬЯ 1. ПСИХОЛОГИЧЕСКИЕ АСПЕКТЫ***

** Исследование выполнено при финансовой поддержке Министерства культуры РФ и РФФИ по проекту № 16-06-00172а.*



Дмитрий Леонидович СПИВАК / Dimitry SPIVAK | Нэлли Леонидовна САМУС / Nelli SAMUS | Андрей Генрихович ЗАХАРЧУК / Andrey ZAKHARCHUK | Ирина Михайловна СПИВАК / Irina SPIVAK

| Психологические аспекты восприятия традиционной музыки пожилыми людьми и их мозговые корреляты. Статья 1. Психологические аспекты / Psychological Effects of Perception of Traditional Music by Elderly Persons and their Brain Correlates. Article 1. Psychological Effects |

В статье представлены результаты исследования психологической динамики группы из 19 старых и пожилых русскоязычных городских жителей в возрасте 84 ± 7 лет, прошедших двухнедельный аудиокурс легкой классической музыки. Работа представляет собой часть долгосрочной программы изучения фундаментальных механизмов культурного наследования, проводимой в рамках трудов Института наследия, с привлечением специалистов Института мозга человека РАН, и ряда других отечественных академических учреждений. Контрольная группа состояла из 20 практически здоровых молодых русскоязычных городских жителей, в возрасте 22 ± 4 года, наблюдавшихся в сходных условиях. Пакет психологических тестов включал определение уровня когнитивной компетентности по М. Фольштейну с соавт., уровней тревоги и депрессии по А. Зигмонту с соавт., уровней психической активации, напряжения, комфортности, интереса и эмоционального напряжения по Н. А. Курганскому с соавт., а также субъективную оценку удовлетворенности качеством жизни по Дж. Эндикотт с соавт. Каждая из указанных четырех методик была проведена дважды, то есть перед началом аудиокурса, и непосредственно после его окончания. Параллельно была проведена регистрация паттернов мозговой активности в диапазонах как быстрой, так и сверхмедленной активности, а также сбор биографической и анамнестической информации. Как следствие прохождения аудиокурса музыки, принадлежавшей полю культурного наследия респондентов как пожилого, так и молодого возраста, было установлено общее наличие у них позитивной динамики психологических процессов и состояний. В случае пожилой группы, статистически значимые сдвиги были зарегистрированы в случае индекса когнитивной компетентности, а также индекса субъективной удовлетворенности качеством жизни. Судя по дан-

ным факторного анализа, данные индексы являются независимыми друг от друга. При этом индекс субъективной оценки качества жизни проявляет тенденцию к корреляции с индексами психической активации по опроснику Н. А. Курганского, как до прохождения аудиокурса, так и после него. В состав данного фактора входит также и индекс депрессии. Таким образом, высокая оценка качества собственной жизни проявляет тенденцию к прямой корреляции с высоким уровнем психической активации, интереса, комфорта и эмоционального тонуса, а также с пониженным уровнем депрессии. Прочных коррелятивных связей такого рода для индекса когнитивной компетентности в случае пожилой группы выявить пока не удалось.

Ключевые слова: восприятие музыки, культурное наследование, психология пожилого возраста, психическая активация, качество жизни, когнитивная деятельность, тревога, депрессия.

164

**PSYCHOLOGICAL EFFECTS OF PERCEPTION OF TRADITIONAL MUSIC BY ELDERLY PERSONS AND THEIR BRAIN CORRELATES.
ARTICLE 1. PSYCHOLOGICAL EFFECTS**

Psychological dynamics of a group of 19 Russian-speaking aged urban dwellers (aged 84 ± 7), which occurred as a result of passing a two-week course of light classical music, was studied, as part of systematic inquiry into fundamental mechanisms of cultural inheritance, conducted as part of the works of Heritage Institute, in collaboration with researchers of Human Brain Institute, and a number of other academic institutions of Russia. Control group was formed by 20 young normal subjects (aged 22 ± 4), which were observed in strictly the same conditions. Psychological inventory consisted of four tests, which provided an



Дмитрий Леонидович СПИВАК / Dmitry SPIVAK | Нэлли Леонидовна САМУС / Nelli SAMUS | Андрей Генрихович ЗАХАРЧУК / Andrey ZAKHARCHUK | Ирина Михайловна СПИВАК / Irina SPIVAK

| Психологические аспекты восприятия традиционной музыки пожилыми людьми и их мозговые корреляты. Статья 1. Психологические аспекты / Psychological Effects of Perception of Traditional Music by Elderly Persons and their Brain Correlates. Article 1. Psychological Effects |

assessment of cognitive competence by M. Folstein et al., levels of anxiety and depression by A. Zigmont et al., levels of psychological activation, tension, comfort, interest, and emotional activation by N. Kurgansky et al., and personal assessment of life quality and satisfaction by J. Endicott et al. Each of the four tests was conducted before the beginning of the music course, and right after it. Parallel registration of brain activity in the short-wave and ultraslow band-passes was conducted, as well as registration of relevant biographic and anamnestic information. Most positive trends in the psychological dynamics of both the main (older) group and the control (younger) one, as a result of passing a two-week course of music which belonged to the realm of their cultural heritage, were demonstrated. Statistically significant shifts of two psychological indices were demonstrated in the case of the aged group, namely, the index of cognitive

performance, and that of the personal assessment of life quality and satisfaction. Basing on data of factor analysis, these two basic trends were demonstrated to be most probably independent of each other. Index of personal assessment of life quality proved to be related primarily to psychological activation, comfort, interest, and emotional arousal, measured by the Kurgansky scale, both prior to passing the music course, and right after it. It tended to correlate also with the level of depression, measured by Zigmond-Snaith depression scale, so that high scores on the life quality scale tended to correspond to high scores on the scales of the psychological activation, psychological comfort, interest, and emotional arousal, as well as to low scores on depression scale, and vice versa. No stable connection of this kind were demonstrated for cognitive performance.

165

Key words: Perception of Music, Cultural Inheritance, Psychology of Ageing, Psychological Activation, Life Quality, Cognitive Performance, Anxiety, Depression.

The present paper presents results of a long-term research program dedicated to systematic study of psychological effects of perception of traditional / non-traditional music, and of its brain correlates, conducted by Heritage Institute, basing on the facilities of several academic institutions, primarily Human Brain Institute, and Institute of Cytology. Data on music perception by young persons was already presented

by us in a series of previous papers¹. Complementing them by data on music perception by el-

¹ Spivak D.L., Pustoshkin E.A., Khesina A.A., Zakharchuk A.G., Spivak I.M. Psychological Effects of Perception of Traditional / Non-traditional Music and their Brain Correlates. Article 1: Psychological Effects // International Journal of Cultural Research, 2016, No.1 (22), p.142-155; Spivak D.L., Shemyakina N.V., Nagornova Z.V., Pustoshkin E.A., Zakharchuk A.G., Spivak I.M. Psychological Effects of Perception of Traditional / Non-traditional Music and their Brain Correlates. Article 2: Brain Correlates



Дмитрий Леонидович СПИВАК / Dmitry SPIVAK | Нэлли Леонидовна САМУС / Nelli SAMUS | Андрей Генрихович ЗАХАРЧУК / Andrey ZAKHARCHUK | Ирина Михайловна СПИВАК / Irina SPIVAK

| Психологические аспекты восприятия традиционной музыки пожилыми людьми и их мозговые корреляты. Статья 1. Психологические аспекты / Psychological Effects of Perception of Traditional Music by Elderly Persons and their Brain Correlates. Article 1. Psychological Effects |

elderly persons forms the main objective of the present article.

The group studied by us consisted of 19 elderly persons, aged 84±7, including six men and thirteen women, all of whom were Russian-speaking urban dwellers. The group was observed, basing on the facilities of the St. Petersburg Boarding House for Science Veterans of the Russian Academy of Sciences. All inmates of the Boarding House, who were able and willing to communicate, and who consented to pass the music course, became members of the group studied by us.

18 members of the group had no previous history of musical training, one person was graduate of a musical high school². Eight members of the group used to listen to music in the course of their everyday life, 7 persons did this, but rather seldom, while 4 persons did not listen to music regularly³.

Each member of the group signed the usual form of informed consent, passed psychological testing, and the psychophysiological one. After that, all members of the group passed a two-week

course of traditional music, 90 minutes a day. The course consisted in quite listening to light classical music, which was quite well known to all of the subjects – in fact, it formed integral part of their cultural heritage. All of the recordings applied in our study had been officially recommended by the Centre of Rehabilitation Medicine of the Ministry of Health of the Russian Federation, for means of ‘stress reduction, relaxation, and healing’⁴.

About a half of the group passed the music course together, listening to it at the concert hall of the Boarding House, which was equipped by relevant technical means. Other persons listened to the same music simultaneously, with the help of broadcasting it to their personal chambers. Each member of the group was free one of these ways of passing the music course or, of switching from one of them to another one, depending on their current state of health.

Right after the end of the music course, the group passed another round of psychological testing and psychophysiological observation. Simul-

// International Journal of Cultural Research, 2016, No.2 (23), p.159-169.

² Aged professional musicians tend to be quite specific in cognitive processing associated with music, cf.: Amer T., Kalender B., Hasher L. et al. Do Older Professional Musicians have Cognitive Advantages? // PLoS One, 2013, Vol.8, e71630.

³ Music listening seems to be quite high on the list of priorities of aged people, cf.: Hays T., Minichiello V. The Meaning of Music in the Lives of Older People: A Qualitative Study // Psychology of Music, 2005, Vol.33, No.4, p.437–451; Cohen A., Bailey B., Nilsson T. The Importance of Music to Seniors // Psychomusicology, 2002, Vol.18, No.1-2, p.89–102.

⁴ Ocean of Love. An MP3 collection / © «Healing Music». Moscow, Diskart RU, s.a. (audiorecordings certified by the Russian Academy of Pedagogy in 2007). For an overview of basic trends in present-day music therapy, see: Davis W., Gfeller K., Thaut M. An Introduction to Music Therapy: Theory and Practice. Silver Spring: American Music Therapy Association, 2008; Kamioka H., Tsutani K., Yamada M. et al. Effectiveness of Music Therapy: a Summary of Systematic Reviews based on Randomized Controlled Trials of Music Interventions // Patient Preference and Adherence, 2014, Vol.8, p.727–754; Lipe A. Beyond Therapy: Music, Spirituality, and Health in Human Experience - a Review of the Literature // Journal of Music Therapy, 2002, Vol.39, p. 209-240; cf. Petrushin V.I. Music Psychotherapy: Theory and Practice. Moscow: VLA-DOS, 1999 (in Russian).



Дмитрий Леонидович СПИВАК / Dmitry SPIVAK | Нэлли Леонидовна САМУС / Nelli SAMUS | Андрей Генрихович ЗАХАРЧУК / Andrey ZAKHARCHUK | Ирина Михайловна СПИВАК / Irina SPIVAK

| Психологические аспекты восприятия традиционной музыки пожилыми людьми и их мозговые корреляты. Статья 1. Психологические аспекты / Psychological Effects of Perception of Traditional Music by Elderly Persons and their Brain Correlates. Article 1. Psychological Effects |

taneously, biographical and anamnestic data were recorded. A 5 ml sample of blood was also taken in all cases, prior to passing the music course, and right after it, forming a basis for a molecular biological study. Results of this part of our research would be presented in a separate paper.

All of the study was coordinated with the direction of the Veteran Boarding House, and controlled by it.

A group of 20 young Russian-speaking urban dwellers, aged 22±4, which had been studied by us at the preceding stage of our research, was used as control group. Basic characteristics of this group corresponded to those of the aged group: e.g. 15 out of 20 young subjects had no musical education, 3 were graduates of a musical college (which is the basic form of secondary musical education in Russia), and 2 were graduates of a musical institute or, university (for details, cf. papers cited in reference 1 of the present paper). All of them passed a course of light classical music, which formed part of their cultural heritage. The treks were the same, as in the case of the group of aged persons. Thus both groups (that is, bold the old, and the young one) had almost everything in common, apart from their age.

Our initial intention consisted in conducting the study of elderly persons strictly along the lines of the preceding study of young people. In doing this, we succeeded, with one important exception – namely, the psychological testing. Our basic package consisted of 6 questionnaires, 5 of which were standard, while one had been elaborated by us in the framework of the Human Brain Institute. Two of them were directed at the detec-

tion of levels of psychological activation, and of neuroticization, two more questionnaires – at the assessment of levels of activation of psychological defense mechanisms, and strategies of stress coping. Finally, two inventories were directed at the assessment of the level of activation of such hidden reserves, as intrinsic religious attitudes, and altered states of consciousness. This package provided us with an adequate assessment of the levels of psychological tension and stress, and of the levels of activation of psychological defense mechanisms, directed at counteracting stress, and promoting well-being⁵.

Having conducted a number of pilot runs, we noticed that most of the items were quite difficult for the elderly people to understand, while all of the package was definitely too difficult to be conducted in a single run. Rapid fatigability served as the main cause; however features of cognitive deficit were also present. To counteract this set of problems, practically each item of the inventory had to be clarified by the psychologist, and testing was to be divided into several days. This shift helped in some cases, however, it did not work in quite a few others. Data acquired in this way, were definitely not fully comparable to those of the young group, where all of the testing was conducted in a single run, swiftly, and with-

⁵ For details, see Spivak D.L., Pustoshkin E.A., Khesina A.A., Zakharchuk A.G., Spivak I.M. Psychological Effects of Perception of Traditional / Non-traditional Music and their Brain Correlates. Article 1: Psychological Effects // International Journal of Cultural Research, 2016, No.1 (22), p.147-148.



Дмитрий Леонидович СПИВАК / Dmitry SPIVAK | Нэлли Леонидовна САМУС / Nelli SAMUS | Андрей Генрихович ЗАХАРЧУК / Andrey ZAKHARCHUK | Ирина Михайловна СПИВАК / Irina SPIVAK

| Психологические аспекты восприятия традиционной музыки пожилыми людьми и их мозговые корреляты. Статья 1. Психологические аспекты / Psychological Effects of Perception of Traditional Music by Elderly Persons and their Brain Correlates. Article 1. Psychological Effects |

out any consultation with the psychologist in charge⁶.

As a result, and following the advice of psychologists specializing in problems of gerontology, we had to apply a package of psychological tests especially designed for elderly persons. The package comprised three tests, all of which form part of a standard tool kit of present-day psychology:

- 'mini-mental state examination' (MMSE) consisted of 30 short items, allowing to assess quickly orientation in time and space, abilities to hear and to repeat spoken words, to memorize them, to name well-known objects, to fulfill simple verbal instructions, to read and to write, to conduct elementary computations, and to copy a simple figure by hand. As a result, a reliable assessment of the level of cognitive competence was acquired⁷;

- assessment of personal satisfaction by the state of basic components of one's quality of life in the course of the preceding week was conducted. This questionnaire comprised 16 items, including one's physical health and mood, living / hous-

ing situation and household activities, family and social relationships, etc. As a result, 'quality of life enjoyment and satisfaction' was evaluated⁸;

- 'hospital anxiety and depression scale' was applied, which provided quick and reliable assessment of levels of anxiety and depression. This scale, comprising 14 items, is quite popular in present-day clinical practice in order to conduct screening of these two important psychological ailments⁹.

The fourth inventory applied by us, was the same as in the case of the control (young) group. The reason was that our aged subjects had no difficulty in passing it. This test consisted of 20 items, providing assessment of levels of psychological activation, tension, comfort, interest, and emotional activation at the moment of testing. This questionnaire was constructed by Russian experts in psychological diagnostics¹⁰. As to the previous three inventories, their Russian versions, adapted by Russian psychologists, were applied in our study.

Music perception, especially in the form of systematic music therapy, is regarded in present-day science as a potent instrument of correction of

⁶ For general overview of ageing psychology, see: Theoretical Developments in the Psychology of Aging // *The Gerontologist*, 1996, Vol. 36, No. 6, p. 742-748, cf. Khrisanova E.N. Basic Issues in Gerontology: Anthropological Aspects. Moscow, VLADOS, 1999 (in Russian); Antsiferova L.I. Psychology of Ageing: Specific Trends in Personal Development in Late Adulthood // *Psikhologicheskij Zhurnal*, 2001, No.3, p.86-99 (in Russian)

⁷ Folstein M., Folstein S., McHugh P. "Mini-mental state". A Practical Method for Grading the Cognitive State of Patients for the Clinician // *Journal of Psychiatric Research*, 1975, Vol.12, No. 3, p. 189-198.

⁸ Endicott J., Nee J., Harrison W. et al. Quality of Life Enjoyment and Satisfaction Questionnaire: a New Measure // *Psychopharmacology Bulletin*, 1993, Vol.29, p.321-326.

⁹ Zigmond A., Snaith R. The Hospital Anxiety and Depression Scale // *Acta Psychiatrica Scandinavica*, 1983, Vol. 67, p. 361-370.

¹⁰ Kurgansky N.A., Nemchin T.A. Assessment of Psychological Activation, Interest, Emotional Activation, Tension, and Comfort // *Practical Manual in General, Experimental, and Applied Psychology*. St. Petersburg, Piter Publishers, 2006, P. 309-314 (in Russian).



Дмитрий Леонидович СПИВАК / Dimitry SPIVAK | Нэлли Леонидовна САМУС / Nelli SAMUS | Андрей Генрихович ЗАХАРЧУК / Andrey ZAKHARCHUK | Ирина Михайловна СПИВАК / Irina SPIVAK

| Психологические аспекты восприятия традиционной музыки пожилыми людьми и их мозговые корреляты. Статья 1. Психологические аспекты / Psychological Effects of Perception of Traditional Music by Elderly Persons and their Brain Correlates. Article 1. Psychological Effects |

a number of essential psychological states and processes, both on conscious and subconscious level. It is regarded as being particularly effective in treatment of light and medium cognitive disorders¹¹, anxiety and depression¹², and in improvement of the subjective assessment of one's life quality by aged patients¹³.

¹¹ Mammarella N., Fairfield B., Cornoldi C. Does Music Enhance Cognitive Performance in Healthy Older Adults? The Vivaldi Effect // *Aging Clinical and Experimental Research*, 2007, Vol.19, No.5, p.394–399; Särkämö T. Music for the Ageing Brain: Cognitive, Emotional, Social, and Neural Benefits of Musical Leisure Activities in Stroke and Dementia // *Dementia*, 2017, <https://doi.org/10.1177/1471301217729237>; Särkämö T., Tervaniemi M., Laitinen S. Cognitive, Emotional, and Social Benefits of Regular Musical Activities in Early Dementia: Randomized Controlled Study // *Gerontologist*, 2014, Vol.54, No.4, p. 634–650.

¹² Alexopoulos G. Depression in the Elderly // *Lancet*, 2005, Vol.365, No.9475, p.1961–1970; Chu H., Yang C., Lin Y. et al. The Impact of Group Music Therapy on Depression and Cognition in Elderly Persons with Dementia: a Randomized Controlled Study // *Biological Research for Nursing*, 2014, Vol.16, No.2, p.209–217. Sung, H., Chang A., Lee W. A Preferred Music Listening Intervention to Reduce Anxiety in Older Adults with Dementia in Nursing Homes // *Journal of Clinical Nursing*, 2010, Vol.19, No.7-8, p.1056–1064.

¹³ Laukka P. Uses of Music and Psychological Well-being among the Elderly // *Journal of Happiness Studies*, 2007, Vol.8, No.2, p.215–241; Hays T., Minichiello V. The Contribution of Music to Quality of Life in Older People: an Australian Qualitative Study // *Ageing and Society*, 2005, Vol.25, p.261–278; MacDonald R. Music, Health, and Well-being: a Review // *International Journal of Qualitative studies in Health and Well-Being*, 2013, Vol.8, 10.3402/qhw.v8i0.20635; Solé C., Mercadal-Brotons M., Gallego S., Riera M. Contributions of Music to Aging Adults' Quality of

Having applied the 4-item inventory prior to passing the music course, and right after it, data on the dynamics of 12 psychological indices were obtained. They were further subject to routine testing of the normality of their distribution. In the case of normal distribution, Student's test for dependent samples, comparing data prior to music test to those after it, was further applied. In the case distribution was not normal, Wilcoxon's test for dependent samples was used. The result of these calculations is presented in Table 1. As shown by it, changes in psychological functioning, which were highly significant in terms of statistics, occurred in the case of two indices, namely the level of cognitive competence, and that of life satisfaction.

169

Table 1. Statistical analysis of dynamics of psychological indices for main (aged) and control (young) groups, as a result of passing a light classical music course

Life // *Journal of Music Therapy*, 2010, Vol.47, No.3, p.264–281; Vanderak S., Newman I., Bell S. The Effects of Music Participation on Quality of Life of the Elderly // *Music Therapy*, 1983, Vol.3, No.1, p.71–81; cf. a general overview of well-being in later life: Adams K., Leibbrandt S., Moon H. A Critical Review of the Literature on Social and Leisure Activity and Wellbeing in Later Life // *Ageing and Society*, 2011, Vol.31, No.4, p. 683–712.



Дмитрий Леонидович СПИВАК / Dmitry SPIVAK | Нэлли Леонидовна САМУС / Nelli SAMUS | Андрей Генрихович ЗАХАРЧУК / Andrey ZAKHARCHUK | Ирина Михайловна СПИВАК / Irina SPIVAK

| Психологические аспекты восприятия традиционной музыки пожилыми людьми и их мозговые корреляты. Статья 1. Психологические аспекты / Psychological Effects of Perception of Traditional Music by Elderly Persons and their Brain Correlates. Article 1. Psychological Effects |

Group	p-value	Act	Int	Emo	Tens	Comf	Psych	Cogn	Qual -1	Qual -2	Qual -3	Anx	Depr
Main (aged Ss)	SW-ante	0.198	0.317	0.050	0.688	0.840	0.361	0.000‡	0.560	0.000‡	0.018‡	0.063	0.208
	SW-post	0.772	0.003‡	0.336	0.652	0.193	0.128	0.000‡	0.463	0.000‡	0.000‡	0.115	0.512
	St-ante/post	0.507	-	0.740	0.697	0.653	0.848	-	0.083*	-	-	0.359	0.163
	Wt-ante/post	-	0.838	-	-	-	-	0.031*	-	0.424	0.565	-	-
Control (young Ss)	SW-ante	0.147	0.652	0.033‡	0.406	0.251	0.819	-	-	-	-	-	-
	SW-post	0.197	0.842	0.106	0.065	0.431	0.998	-	-	-	-	-	-
	St-ante/post	0.325	0.699	-	0.63	0.764	0.472	-	-	-	-	-	-
	Wt-ante/post	-	-	0.667	-	-	-	-	-	-	-	-	-

Abbreviations. Act – psychological activation, Int – interest, Emo – emotional activation, Tens – psychological tension, Comf – psychological comfort, Psych – aggregate index of psychological activation, tension, comfort, interest, and emotional activation; Cogn – cognitive performance, Qual-1 – aggregate index of ‘quality of life enjoyment and satisfaction’, Qual-2 – satisfaction by quality of treatment and medication at present time (if any), Qual-3 – index of ‘overall life satisfaction and contentment’; Anx – anxiety, Depr – depression. SW-ante – Shapiro-Wilk test prior to music course, SW-post – Shapiro-Wilk test after the music course, St-ante/post – Student’s test for dependent samples, comparing data prior to music test to those after it, Wt -ante/post – Wilcoxon’s test for dependent samples, comparing data prior to music test to those after it. P-values lower than the 0.05 significance level are marked by a double cross (‡) and red colour, differences lower than the 0.05 significance level are marked by an asterisk (*) and red colour. Ss - subjects.



Дмитрий Леонидович СПИВАК / Dmitry SPIVAK | Нэлли Леонидовна САМУС / Nelli SAMUS | Андрей Генрихович ЗАХАРЧУК / Andrey ZAKHARCHUK | Ирина Михайловна СПИВАК / Irina SPIVAK

| Психологические аспекты восприятия традиционной музыки пожилыми людьми и их мозговые корреляты. Статья 1. Психологические аспекты / Psychological Effects of Perception of Traditional Music by Elderly Persons and their Brain Correlates. Article 1. Psychological Effects |

In order to interpret these shifts, descriptive statistics for all the 12 psychological indices were calculated. As shown by Table 2, before the onset of the music course, cognitive competence of the aged group balanced at the border between light dementia, and occasional cognitive disturbances preceding its onset. After the course, the level of cognitive competence improved considerably, balancing at the border between light cognitive lapses, and the normal level¹⁴. A similar regularity was proper for the index of 'quality of life enjoyment and satisfaction'. Prior to the beginning of music course, it belonged to the upper part of the medium level span, while after the course, it shifted to the lower part of the high level span¹⁵. This means that in the case of both psychological indices which shifted in a statistically significant way, as a result of passing the music course, their dynamics was undoubtedly positive.

¹⁴ As stated by the authors of the MMSE inventory, the level of 20 to 23 points roughly corresponds to light dementia, 24 to 27 – to pre-dementia cognitive disturbances, 28 to 30 – to normal cognitive competence. For details, see: Folstein M., Folstein S., McHugh P. "Mini-mental state". A Practical Method for Grading the Cognitive State of Patients for the Clinician // Journal of Psychiatric Research, 1975, Vol.12, No. 3, p. 189–198.

¹⁵ Following the logic of the authors of the corresponding inventory, we have tentatively divided the span of the index of general 'quality of life enjoyment and satisfaction' into the lower part (values from 14 to 32 points), medium (33 to 51), and the upper one (values from 52 to 70), cf. Endicott J., Nee J., Harrison W. et al. Quality of Life Enjoyment and Satisfaction Questionnaire: a New Measure // Psychopharmacology Bulletin, 1993, Vol.29, p.321-326.

Turning to psychological indices whose shifts were not statistically significant, their absolute values were regarded, basing on data of Table 2. Taking into account assessments of the authors of corresponding questionnaires, the levels of their psychological and emotional activation, psychological tension and comfort, may be defined as medium. The level of interest was intermediate between medium and high (see the left part of Table 2)¹⁶. The level of anxiety was practically normal, while the level of depression was subclinical (i.e. medium, see the right part of Table 2)¹⁷. This means that psychological processes which were not affected by passing the music course in a statistically significant way, remained at a normal or, high level.

Table 2. Descriptive statistics of psychological indices for main (aged) and control (young) groups, as a result of passing a light classical music course

Abbreviations. Ante – prior to the music course, post – after it. Max – maximal value, UQ – upper quartile, Mean – mean value, Med – median value, LQ – lower quartile, Min – minimal value, Sd – standard deviation. Ss – subjects. For other abbreviations, see note to Table 1.

¹⁶ For the interpretation of absolute values, cf. Kurgansky N.A., Nemchin T.A. Assessment of Psychological Activation, Interest, Emotional Activation, Tension, and Comfort // Practical Manual in General, Experimental, and Applied Psychology. St.Petersburg, Piter Publishers, 2006, P. 310-311 (in Russian).

¹⁷ Zigmond A., Snaith R. The Hospital Anxiety and Depression Scale // Acta Psychiatrica Scandinavica, 1983, Vol. 67, p. 361-370.



Дмитрий Леонидович СПИВАК / Dimitry SPIVAK | Нэлли Леонидовна САМУС / Nelli SAMUS | Андрей Генрихович ЗАХАРЧУК / Andrey ZAKHARCHUK | Ирина Михайловна СПИВАК / Irina SPIVAK

| Психологические аспекты восприятия традиционной музыки пожилыми людьми и их мозговые корреляты. Статья 1. Психологические аспекты / Psychological Effects of Perception of Traditional Music by Elderly Persons and their Brain Correlates. Article 1. Psychological Effects |

Group	Index	Act	Int	Emo	Tens	Comf	Psych	Cogn	Qual-1	Qual-2	Qual-3	Anx	Depr
Main (aged Ss / ante)	Max	20	16	16	19	19	81	30	73	4	5	17	16
	UQ	15.5	11.5	12.5	16	14	66.5	27.5	55	4	4	10	13.5
	Mean	12.16	8.9	10	14.63	11.37	57.05	23.32	48.26	3.47	3.68	6.9	9.05
	Med	10	8	9	15	12	57	26	50	3	4	6	9
	LQ	9	6.5	7	13	8.5	48.5	22	37	3	3	3	5.5
	Min	5	3	5	9	4	37	5	21	3	2	1	2
	SD	4.59	3.84	3.48	2.5	4.23	13.71	6.98	14.66	0.51	0.89	4.88	4.36
Main (aged Ss / post)	Max	19	16	16	20	20	73	30	79	4	5	16	14
	UQ	15.5	11	11	17	13.5	68	30	57	4	4	10.5	10.5
	Mean	12.68	8.79	9.74	14.89	11	56.58	24.26	51.89	3.58	3.58	7.63	8.11
	Med	13	7	10	15	11	56	29	54	4	4	8	8
	LQ	10	6	7.5	13	7.5	45.5	19.5	47	3	3	3	5.5
	Min	4	6	4	9	3	38	9	20	3	3	1	2
	SD	3.96	3.22	3.36	3.14	4.03	11.81	6.81	14.67	0.51	0.61	5.05	3.56
Contr ol (youn g Ss / ante)	Max	18	16	14	17	18	70	-	-	-	-	-	-
	UQ	14.25	10.25	10.25	13.25	11	58	-	-	-	-	-	-
	Mean	11.05	9.55	8.2	12.3	9.25	50.3	-	-	-	-	-	-
	Med	11	9.5	7	12	8.5	51.5	-	-	-	-	-	-
	LQ	8	8	5.75	11	7	43.5	-	-	-	-	-	-
	Min	6	4	3	9	3	29	-	-	-	-	-	-
	SD	3.94	2.95	3.47	2.13	4.24	11.85	-	-	-	-	-	-
Contr ol (youn g Ss / post)	Max	17	16	15	20	19	78	-	-	-	-	-	-
	UQ	14.5	12	10.25	13.25	11.25	59.25	-	-	-	-	-	-
	Mean	11.8	9.85	7.95	12.65	9.55	51.8	-	-	-	-	-	-
	Med	12	9.5	8	12.5	9.5	50	-	-	-	-	-	-
	LQ	10	7	4.75	10.75	7	45	-	-	-	-	-	-
	Min	6	4	3	9	4	28	-	-	-	-	-	-
	SD	3.49	3.36	3.71	2.64	3.75	12.43	-	-	-	-	-	-



Дмитрий Леонидович СПИВАК / Dmitry SPIVAK | Нэлли Леонидовна САМУС / Nelli SAMUS | Андрей Генрихович ЗАХАРЧУК / Andrey ZAKHARCHUK | Ирина Михайловна СПИВАК / Irina SPIVAK

| Психологические аспекты восприятия традиционной музыки пожилыми людьми и их мозговые корреляты. Статья 1. Психологические аспекты / Psychological Effects of Perception of Traditional Music by Elderly Persons and their Brain Correlates. Article 1. Psychological Effects |

No statistically significant shifts were revealed for the 6 indices of the psychological activation inventory, either for the aged group or, for the young one, as shown by the left part of Table 2. This means that no formal comparison of the psychological dynamics of these groups would be possible at this stage of our research. However we wish to remind that the effect of passing the music course in the case of the young group was in fact quite positive. For instance, the index of neurotization shifted to the positive part of its span in a statistically most significant way¹⁸. As a result, we may state that passing a course of traditional music tends to induce most positive psychological shifts in the case of both the old group, and the young one. Formally proving their affinity remains an objective for our future research, due to methodological difficulties.

In order to get more information about the psychological functioning of the aged subjects, factor analysis was applied. Results of two-factor analysis of the psychological data prior to the music course are presented in Table 3; results of the corresponding analysis for data after the course form Table 4. Regarding both tables, one feels authorized to make three basic conclusions:

- index of cognitive performance does not seem to be correlated to index of 'quality of life enjoyment and satisfaction'. In fact, they belong to different factors, both prior to passing the music

¹⁸ For corresponding data, see Spivak D.L., Pustoshkin E.A., Khesina A.A., Zakharchuk A.G., Spivak I.M. Psychological Effects of Perception of Traditional / Non-traditional Music and their Brain Correlates. Article 1: Psychological Effects // International Journal of Cultural Research, 2016, No.1 (22), p.151.

course (Table 3, factors 1 and 2), and after it (Table 4, the same factors)¹⁹;

- personal assessment of life quality is linked by stable correlation to both the aggregate index of psychological activation, and to the bulk of partial indices comprised by it. The higher the level of psychological activation (interest, emotional activation, comfort), the better the personal feeling of life quality, and vice versa²⁰. This regularity is proper for both the state before passing the music course, and after it (column 1 in Tables 3-4).

- depression index is linked to the index of psychological activation by direct correlation: the higher the level of inner tension, the greater the risk of depression, and vice versa. This trivial regularity, which is proper for both the state before passing the music course, and after it, tends to cor-

¹⁹ For present-day views on life quality by older people, see: Hughes B. Gerontological Approaches to Quality of Life // Ageing and Later Life. London: Sage, 1999, p. 228-232; George L., Bearon L. Quality of Life in Older Persons: Meaning and Measurement. N.Y., Human Sciences Press, 1980.

²⁰ Positive psychological activation is linked to low scores by the corresponding test, and vice versa. For details, see Kurgansky N.A., Nemchin T.A. Assessment of Psychological Activation, Interest, Emotional Activation, Tension, and Comfort // Practical Manual in General, Experimental, and Applied Psychology. St. Petersburg, Piter Publishers, 2006, P. 310-311 (in Russian). High level of personal assessment of life quality is linked to high scores by the corresponding test, and vice versa, cf. Endicott J., Nee J., Harrison W. et al. Quality of Life Enjoyment and Satisfaction Questionnaire: a New Measure // Psychopharmacology Bulletin, 1993, Vol.29, p.322-325. As a result, values of psychological activation are positive in column 1 of Tables 3-4, while those of life quality in the same column are negative.



Дмитрий Леонидович СПИВАК / Dmitry SPIVAK | Нэлли Леонидовна САМУС / Nelli SAMUS | Андрей Генрихович ЗАХАРЧУК / Andrey ZAKHARCHUK | Ирина Михайловна СПИВАК / Irina SPIVAK

| Психологические аспекты восприятия традиционной музыки пожилыми людьми и их мозговые корреляты. Статья 1. Психологические аспекты / Psychological Effects of Perception of Traditional Music by Elderly Persons and their Brain Correlates. Article 1. Psychological Effects |

roborate other regularities, revealed by our analysis, which are less obvious.

Table 3. Two-factor analysis of psychological indices of the aged group, before passing the music course

Notes. Act – psychological activation, Int – interest, Emo – emotional activation, Tens – psychological tension, Comf – psychological comfort, Psych – aggregate index of psychological activation, tension, comfort, interest, and emotional activation; Cogn – cognitive performance, Qual-1 – aggregate index of ‘quality of life enjoyment and satisfaction’, Qual-2 – satisfaction by quality of treatment and medication at present time (if any), Qual-3 – index of ‘overall life satisfaction and contentment’, Anx – anxiety, Depr – depression, Gen-1 – A1/A2 polymorphism of 5HT2A serotonin receptor gene, Gen-2 - L/S polymorphism of serotonin transporter gene²¹, Age – age of the Ss, Sex – sex of the Ss, EV – factor eigenvalue, % - percentage of variance explained, Ss - subjects. Method of factor determination: main components, rotation of the load matrix. Factor loadings $\geq 0,55$ are marked by red colour and an asterisk (*).

Index	Factor 1	Factor 2
Act	0.749511*	-0.043960
Int	0.894088*	0.168115
Emo	0.775393*	0.296946
Tens	0.111307	0.397491
Comf	0.589630*	0.562575*
Psych	0.900482*	0.353937
Cogn	-0.229983	0.702785*
Qual-1	-0.773429*	0.112705
Qual-2	-0.165003	-0.472984
Qual-3	-0.364036	-0.654072*
Anx	0.180915	0.349532
Depr	0.867522*	-0.128941
Gen-1	-0.154483	0.337416
Gen-2	0.206437	-0.195619
Age	-0.317139	0.619053*
Sex	-0.105005	0.005031
EV	4.907558	2.550433
%	0.306722	0.159402

²¹ Genetic data, acquired in the course of our research, would not be regarded in the text of the present paper, as they form subject of a special work.



Дмитрий Леонидович СПИВАК / Dmitry SPIVAK | Нэлли Леонидовна САМУС / Nelli SAMUS | Андрей Генрихович ЗАХАРЧУК / Andrey ZAKHARCHUK | Ирина Михайловна СПИВАК / Irina SPIVAK

| Психологические аспекты восприятия традиционной музыки пожилыми людьми и их мозговые корреляты. Статья 1. Психологические аспекты / Psychological Effects of Perception of Traditional Music by Elderly Persons and their Brain Correlates. Article 1. Psychological Effects |

Index	Factor 1	Factor 2
Act	0.849782*	0.265494
Int	0.609716*	-0.075877
Emo	0.800142*	-0.408346
Tens	-0.142553	0.664640*
Comf	0.855828*	0.322839
Psych	0.918620*	0.202180
Cogn	-0.340532	0.818383*
Qual-1	-0.854496*	0.179878
Qual-2	-0.309035	0.025513
Qual-3	-0.622912*	-0.261893
Anx	0.376280	0.615645*
Depr	0.748613*	-0.159804
Gen-1	0.142329	0.444171
Gen-2	0.319095	-0.101951
Age	-0.076772	0.362461
Sex	-0.072149	-0.066555
EV	5.495571	2.349229
%	0.343473	0.146827

Table 4. Two-factor analysis of psychological indices of the aged group, after passing the music course

Note. For abbreviations and details, see Notes to Table 3.

The results obtained in the course of the two-factor analysis, conducted above, on the basis of Tables 3-4, seem to be quite accurate. They are corroborated by the results of the three-factor analysis of the same data. For the sake of brevity, only the corresponding table for the state after passing the music course, would be cited below (Table 5). Regarding its data, we find basically the same types of correlations, as those acquired as a result of the two-factor analysis. To reformulate their essence in a most brief way, personal assessment of life quality, and level of cognitive performance tend to form two independent facets of the psychological dynamics of our aged subjects. The former index seems to be firmly linked to both the level psychological activation /tension, and depression. The links of the latter index tend to be less stable and clear.



Дмитрий Леонидович СПИВАК / Dmitry SPIVAK | Нэлли Леонидовна САМУС / Nelli SAMUS | Андрей Генрихович ЗАХАРЧУК / Andrey ZAKHARCHUK | Ирина Михайловна СПИВАК / Irina SPIVAK

| Психологические аспекты восприятия традиционной музыки пожилыми людьми и их мозговые корреляты. Статья 1. Психологические аспекты / Psychological Effects of Perception of Traditional Music by Elderly Persons and their Brain Correlates. Article 1. Psychological Effects |

Index	Factor 1	Factor 2	Factor 3
Act	0.879205*	0.068707	0.224731
Int	0.776295*	-0.168612	-0.284130
Emo	0.640848*	-0.585621*	0.231805
Tens	0.130143	0.704594*	-0.215731
Comf	0.767391*	0.096614	0.499103
Psych	0.928530*	-0.009066	0.241032
Cogn	-0.195830	0.864267*	0.099364
Qual-1	-0.564318**	0.411744	-0.635210*
Qual-2	-0.147495	0.123719	-0.367631
Qual-3	-0.459575	-0.075109	-0.581116*
Anx	0.617292*	0.540130	-0.093198
Depr	0.687693*	-0.323259	0.158807
Gen-1	-0.142519	0.323879	0.852586*
Gen-2	0.062048	-0.216495	0.522973
Age	-0.040781	0.360991	0.113711
Sex	-0.019116	-0.035400	-0.157268
EV	4.724246	2.498983	2.496894
%	0.295265	0.156186	0.156056

Table 5. Three-factor analysis of psychological indices of the aged group, after passing the music course

Note. For abbreviations and details, see Notes to Table 3.

Basic trends in the psychological dynamics by elderly subjects, occurring as a result of passing a course of traditional music, have been traced back in the present paper. We plan to present the brain correlates of this dynamics in the following article.

Conclusions

1. As a result of passing a two-week course of traditional music, most positive dynamics of the psychological state of members of both the older group, and the control (younger) one, were registered;

2. In the case of the aged group (subjects aged 84±7):

- Statistically significant shifts of two indices, namely, the index of cognitive performance, and that of the personal assessment of life quality, were demonstrated;

- Shift in the level of cognitive performance tended to occur independently of the shift in the personal assessment of life quality, both prior to passing the music course, and after it, as shown by factor analysis;

- High scores on the life quality scale were shown to be related to high scores on the scales of



Дмитрий Леонидович СПИВАК / Dimitry SPIVAK | Нэлли Леонидовна САМУС / Nelli SAMUS | Андрей Генрихович ЗАХАРЧУК / Andrey ZAKHARCHUK | Ирина Михайловна СПИВАК / Irina SPIVAK

| Психологические аспекты восприятия традиционной музыки пожилыми людьми и их мозговые корреляты. Статья 1. Психологические аспекты / Psychological Effects of Perception of Traditional Music by Elderly Persons and their Brain Correlates. Article 1. Psychological Effects |

psychological activation, psychological comfort, interest, and emotional arousal, as well as the Zigmond-Snaith depression scale.

Acknowledgements

The authors are grateful to V. V. Aristarkhov, who has initiated this study, and to S. V. Medvedev, A. S. Mironov, E. V. Bakhrevsky, and G. V. Kataeva, who have supported it.

The authors would also wish to thank E. A. Pustoshkin, who undertook the task of selecting non-traditional musical treks, acting in contact with the American psychologist E. Thompson; A. P. Reva, who took part in psychological testing, processing its results, and in conducting the music course; and A. A. Mamonov, who conducted statistical processing of the psychological data.

The study was sponsored by Ministry of Culture of the Russian Federation, and by the Russian Foundation for Basic Research, grant 16-06-00172a.

