

O.V. Tymoshchuk^{1*},
I.V. Serheta²,
O.S. Malyshevska¹,
V.I. Melnyk¹,
V.B. Motriuk¹

**MEDICO-SOCIAL CONDITIONS
OF EDUCATIONAL ACTIVITY,
QUALITY OF LIFE AND ASPECTS
OF PSYCHOPHYSIOLOGICAL ADAPTATION
OF MODERN PUPILS AND STUDENTS:
FEATURES OF INTERRELATION
AND THEIR HYGIENIC ASSESSMENT**

*Ivano-Frankivsk National Medical University¹
Halytska str., 2, Ivano-Frankivsk, 76001, Ukraine
National Pirogov Memorial Medical University, Vinnytsya²
Pirogov str., 56, Vinnytsia, 21018, Ukraine
Івано-Франківський національний медичний університет¹
вул. Галицька, 2, Івано-Франківськ, 76001, Україна
Вінницький національний медичний університет ім. М. І. Пирогова²
вул. Пирогова, 56, Вінниця, 21018, Україна
e-mail: oksanavorob4ak@gmail.com

Цитування: *Медичні перспективи*. 2023. Т. 28, № 1. С. 153-161

Cited: *Medicni perspektivi*. 2023;28(1):153-161

Key words: *pupils and students, educational activity, medico-social conditions, quality of life, psychophysiological adaptation, hygienic assessment*

Ключові слова: *учні й студенти, навчальна діяльність, медико-соціальні умови, якість життя, психофізіологічна адаптація, гігієнічна оцінка*

Abstract. **Medico-social conditions of educational activity, quality of life and aspects of psychophysiological adaptation of modern pupils and students: features of interrelation and their hygienic assessment.** **Tymoshchuk O.V., Serheta I.V., Malyshevska O.S., Melnyk V.I., Motriuk V.B.** *The purpose of the study is a comprehensive hygienic assessment of the relationship between medico-social conditions of educational activities, quality of life and adaptive capabilities of students. During the research conducted on the basis of 5 modern educational institutions of different types: university, college, specialized school, lyceum and school, the significant deviations of indicators of hygienic assessment of daily regimen of pupils and students from generally accepted normative values ($p < 0.05-0.001$) were revealed, which, first of all, concerned the excess of the maximum allowable duration of their daily stay in educational institutions, the length of time required to complete homework, low levels of physical activity, etc. It was found that the highest levels of quality of life among boys and girls are recorded according to the scales of Physical Functioning (PF), Bodily Pain (BP) and Role-Physical (RP), the lowest ones were Mental Health (MH), Vitality (VT) and Social Functioning (SF). The relationships between the values that indicate the characteristics of quality of life and features of the psychophysiological adaptation of pupils and students were revealed. Moreover, the largest number of relationships ($r = 0.36-0.77$; $p < 0.05-0.001$) which characterize quality of life indicators belong to boys according to the scales of Physical Functioning (PF), Mental Health (MH), Vitality (VT), Bodily Pain (BP); to girls – Bodily Pain (BP), Vitality (VT), Mental Health (MH), General Health (GH), Role-Emotional (RE). When determining the features of intersystem relationships between components of quality of life and indicators of psychophysiological functions, it was found that the closest relationship ($r = 0.37-0.99$; $p < 0.05-0.001$) is observed between the characteristics of the speed of visual-motor reactions, mobility and balance of nervous processes, coordination of movements and indicators of quality of life according to the scales of General Health (GH), Physical Functioning (PF), Social Functioning (SF) and Mental Health (MH).*

Реферат. **Медико-соціальні умови навчальної діяльності, якість життя та особливості психофізіологічної адаптації сучасних учнів і студентів: особливості взаємозв'язку та їх гігієнічна оцінка.** **Тимошук О.В. Сергета І.В., Малишевська О.С., Мельник В.І., Мотрюк В.Б.** *Метою роботи є комплексна гігієнічна оцінка особливостей взаємозв'язку медико-соціальних умов навчальної діяльності, якості життя та адаптаційних можливостей учнівської і студентської молоді, що навчається в умовах закладів освіти різних типів. У ході досліджень, проведених на базі 5 сучасних закладів освіти: університету, коледжу, училища, ліцею і школи, з використанням гігієнічних, медико-соціологічних, психофізіологічних та статистичних методів, виявлена*

наявність суттєвих відхилень показників гігієнічної оцінки режиму дня учнів та студентів від загальноприйнятих нормативних значень, що, насамперед, стосується перевищення величин максимально допустимої тривалості їх денного перебування в закладах освіти, тривалості часу, який необхідний для виконання домашніх завдань, часу перебування на свіжому повітрі в робочі та вихідні дні, пасивного характеру проведення перерв між заняттями, низького рівня рухової активності тощо. Встановлено, що найвищі за ступенем вираження показники особливостей якості життя як серед юнаків, так і серед дівчат, що навчаються в закладах освіти різних типів, реєструються за шкалами фізичного функціонування *Physical Functioning (PF)*, впливу больових відчуттів на здатність до ефективного виконання повсякденної діяльності *Bodily Pain (BP)* та впливу фізичного стану на рольове функціонування *Physical Functioning (RP)*, найнижчі – за шкалами психічного здоров'я *Mental Health (MH)*, життєздатності *Vitality (VT)*, а також, найбільшою мірою, соціального функціонування *Social Functioning (SF)*. Найвищий рівень розвитку провідних показників якості життя спостерігається серед представників та представниць університету й ліцею, найнижчий – серед представників та представниць училища й школи. Визначена наявність численних взаємозв'язків між показниками, які відзначають критеріальні характеристики якості життя та функціональні можливості організму, рівень розвитку психофізіологічних функцій і особливості перебігу психофізіологічної адаптації учнів та студентів. Причому найбільша кількість кореляційних зв'язків ($r=0,36-0,77$; $p<0,05-0,001$) у юнаків властива для показників якості життя за шкалами *Physical Functioning (PF)*, *Mental Health (MH)*, *Vitality (VT)*, *Bodily Pain (BP)*, у дівчат – для показників якості життя за шкалами *Bodily Pain (BP)*, *Vitality (VT)*, *Mental Health (MH)*, *General Health (GH)* та *Role-Emotional (RE)*. Під час визначення особливостей міжсистемних зв'язків між окремими компонентами якості життя та показниками психофізіологічних функцій встановлено, що найбільш тісний зв'язок ($r=0,37-0,99$; $p<0,05-0,001$) спостерігається між такими характеристиками психофізіологічної адаптації, як латентний період простої і диференційованої зорово-моторної реакції, рухливість і зрівноваженість нервових процесів, критична частота злиття світлових миготінь і координація рухів, та показниками якості життя за шкалами *General Health (GH)*, *Physical Functioning (PF)*, *Social Functioning (SF)* і *Mental Health (MH)*.

Among the leading adequate hygienic pre-nosological diagnostics in the field of determining the peculiarities of adaptation processes, especially psychophysiological adaptation (PPA) and the formation of a high level of health of different population groups (including students and pupils) there are many approaches providing the establishment of functional states on the verge of norm and pathology for adequate early diagnosis of borderline mental disorders and determining the detection of pre-nosological changes in psychophysiological and mental indicators in cases of various somatic diseases [1, 5, 6, 7].

In general, it should be noted that pre-nosological changes in health are intermediate conditions between the norm and pathology. They do not fully meet the criteria of the average norm and are characterized by certain subthreshold conditions and disorders of mental adaptation (the process of establishing optimal personality ratio and the environment in the course of human activities), socio-psychological adaptation (the result of active adaptation of the individual to constantly changing environmental conditions) and PPA (optimal organization of psychophysiological ratio of the body) [3, 4, 7, 15]. The latter one is the most significant, especially in the context of forming a certain level of quality of life (QOL), which is a generalized characteristic of physical, psychological, emotional and social functioning of the human body, which reproduces its subjective perception of the somatic and mental state in direct connection with the actual state of health. Moreover,

the main components of the concept of QOL are considered to be: the level of physical (ability to perform physical work, ability to self-care), mental (features of mental state and behavioural actions) and social (social support and relationships with others) well-being [2, 7, 8].

Therefore, at the present stage of conducting a comprehensive hygienic assessment of the relationships between medical and social conditions of educational activities, QOL and adaptive capabilities of pupils and students of different types of educational institutions, which is the purpose of the research.

MATERIALS AND METHODS OF RESEARCH

The research was conducted on the basis of 5 modern educational institutions: Precarpathian National University named after V. Stefanyk (observation group 1 – 60 students (30 boys and 30 girls)), Ivano-Frankivsk College named after S. Granat (observation group 2 – 60 students (30 boys and 30 girls)), Ivano-Frankivsk music school named after D. Sichynskiy (observation group 3 – 60 students (30 boys and 30 girls)), Ivano-Frankivsk lyceum No. 15 (observation group 4 – 60 students (30 boys and 30 girls)) and Ivano-Frankivsk school for gifted children (observation group 5 – 60 students (30 boys and 30 girls)).

To assess the educational and extracurricular activities of pupils and students, features of the educational process, living conditions, physical activity and to determine the level of educational adaptation

and lifestyle characteristics of boys and girls, the survey and interview methods were used [3, 5, 6].

The assessment of QOL features of schoolchildren and students was carried out on the basis of the questionnaire “SF-36 Health Status Survey”, which is popular in Europe and North America and is a non-specific questionnaire used to achieve the goal [2, 7, 10].

Functional features of higher nervous activity were studied on the basis of determining the values of latent periods (LP) of simple (SVMR) and differentiated (DVMR) visual-motor response, characteristics of mobility (MNP) and balance (BNP) of nervous processes using chronoreflexometry, stability of attention and features of mental performance (based on the use of Schulte tables), functional features of the visual sensory system (by estimating the critical fusion frequency of light flicker with the help of the “Svitlotest” method), functional features of the somatosensory analyzer (due to the evaluation of movement coordination indicators using the thermometry techniques) [5, 6].

Statistical processing of the obtained data, substantiation of scientific bases of complex hygienic assessment of QOL and adaptive capabilities of pupils and students were carried out using descriptive statistics, correlation and cluster analysis based on the application of statistical analysis software package “Statistica 6.1” (licensed No. BXXR901E245722FA) [1].

The study involved informed consent of all participants and fully met the basic bioethical standards of the Helsinki Declaration, the Council of Europe Convention on Human Rights and Biomedicine, the leading regulations of the WHO and the Ministry of Health of Ukraine, and ethical standards established by the Ethics Commission of Ivano-Frankivsk National Medical University (Minutes No. 110/19 of 10.10.2019).

RESULTS AND DISCUSSION

The results of hygienic assessment of the day regimen of pupils and students of modern educational institutions allowed to identify significant ($p < 0.05-0.001$) deviations from the generally accepted normative values of the leading forms of educational and extracurricular activities. Considering their structural features, it should be emphasized, that, first of all, it concerns a significant excess of the maximum allowable duration of their day stay in educational institutions (the educational process lasted more than 9 hours in 3.3% of girls studying in music school; from 8 to 9 hours – in 30.0% of boys and 13.3% of girls studying at college, and in 43.3% of boys and 20.0% of girls studying in school; from 7 to 8 hours – in 40.0% of boys and 53.3% of girls studying at the university, 73.3% of boys and 56.7% of girls studying at college, 40.0% of boys and 43.3% of girls studying

in music school, 3.3% of boys and 6.7% of girls studying at the lyceum, 95.4% of boys and 94.6% of girls studying in school). The period of time needed for practical classes and homework outside the educational institution was also too long (more than 4 hours were spent on these classes by 3.3% of university boys, 10.0% of boys and 6.7% of girls studying at college, 23.3% of boys and 10.0% of girls studying in music school, as well as 30.0% of boys and 36.7% of girls studying in school; from 3 to 4 hours – 23.3% of boys and 33.3% of girls studying at the university, 10.0% of boys and 13.3% of girls studying at college, 23.3% of boys and 23.3% of girls studying in music school, 3.3% of boys and 6.7% of girls studying at the lyceum, 50.0% of boys and 53.3% of girls studying in school).

Analyzing the leading indicators of motor activity of pupils and students, it should be noted that in the vast majority of cases its values were much lower ($p < 0.001$) than normative values. In general, the duration of the dynamic component in the daily regimen for less than 1 hour was typical for 30.0% of boys and 36.7% of girls from the university, 20.0% of boys and 43.3% of girls studying at college, 26.7% of boys and 33.3% of girls studying in music school, 10.0% of boys and 6.7% of girls studying at the lyceum, and 50.0% of boys and 63.3% of girls studying in school; the duration of the dynamic component in the daily regimen in the range from 1 to 2 hours was typical for 43.3% of boys and 40.0% of girls from the university, 43.3% of boys and 23.3% of girls studying at college, 60.0% of boys and 36.7% of girls studying in music school, 46.6% of boys and 43.3% girls studying at the lyceum, as well as 23.3% of boys and 13.3% of girls studying in school.

It is necessary to pay attention to the predominantly passive breaks between classes, as it has a negative impact on the level of adaptive capacity of the body of boys and girls. Active forms of rest ($p < 0.05$) during breaks were typical for only 6.7% of boys and 16.7% of girls studying at the university, 6.7% of boys and 10.0% of girls studying at college, 3.3% of boys and 13.3% of girls studying in musical school, 10.0% of boys and 26.7% of girls studying at the lyceum, and 3.3% of boys and 10.0% of girls studying in school.

The largest share of pupils and students under study defined the nature of their studying at modern educational institutions as “intense” – respectively 20.0% of boys and 20.0% of girls studying at the university, 40.0% of boys and 43.3% of girls studying at college, 40.0% of boys and 30.0% of girls studying in music school, 23.3% of boys and 20.0% of girls studying at the lyceum, as well as 40.0% of boys and 43.3% of girls studying in school; and as “moderately

intense” – 23.3% of boys and 30.0% of girls studying at the university, 46.7% of boys and 53.3% of girls studying at college, 40.0% of boys and 60.0% of girls studying in music school, 23.3% of boys and 33.3% of girls studying at the lyceum, and 46.7% of boys and 53.3% of girls studying in school. Besides, during the study, both students and schoolchildren felt constant fatigue. Such problem was typical for 40.0% of boys and 43.3% of girls studying at the university, 43.3% of boys and 43.3% of girls studying at college, 43.3% of boys and 56.7% of girls studying in music school, 20.0% of boys and 20.0% of girls studying at the lyceum, as well as 56.7% of boys and 53.3% of girls studying in school.

The obtained data confirm the tendencies revealed during the study of the degree of satisfaction with the educational process, its content and features of the organization are given in a number of studies conducted in recent years [9, 11], and at the same time, they prove a rather intense studying process in modern educational institutions.

In the course of the research aimed at determining the characteristics of QOL of pupils and students based on the use of the questionnaire “SF-36 Health Status Survey”, it was found that both boys and girls who studied in different educational institutions showed the highest rates of Physical Functioning, the impact of pain on the ability to effectively perform daily activities (Bodily Pain), and the influence of physical condition on the role functioning (Role-Physical). Mental Health, Vitality and Social Functioning rates were the lowest in both boys and girls. There were significant ($p < 0.05$) (and in some cases highly significant ($p < 0.01-0.001$)) gender differences in the indicators of QOL on Vitality, Physical Social Functioning and Physical Functioning.

According to the majority of the studied characteristics of QOL, the inherent to pupils and students exceeded the level of standardized population indicators established for their age [2]. In the process of research, we determined quality of life indicators: on the General Health scale – 63.80-70.70 inherent in boys and 61.68-64.73 inherent in girls (standardized population values – 54.40 and 55.74 points); on the Physical Functioning scale – 89.83-93.00 inherent in boys and 85.10-86.83 inherent in girls (standardized population values – 54.99 and 55.16 points); on the Role-Physical scale – 71.40-80.00 inherent in boys and 71.46-78.20 inherent in girls (standardized population values – 53.44 and 53.67 points); on the Role-Emotional scale – 57.00-63.96 inherent in boys and 54.63-69.93 inherent in girls (standardized population values – 53.77 and 50.74 points); on the Bodily Pain scale – 77.02-79.00 inherent in boys and

72.04-78.60 inherent in girls (standardized population values – 56.64 and 53.67 points); on the Vitality scale – 70.46-71.00 inherent in boys and 54.33-55.83 inherent in girls (standardized population values – 54.40 and 51.69 points); on the Mental Health scale – 71.16-72.96 inherent in boys and 61.03-65.60 inherent in girls (standardized population values – 54.07 and 50.93 points). And only the indicators of QOL on the Social Functioning scale (50.16-54.86 points for boys and 43.05-45.06 points for girls) did not reach the level of standardized population values (54.85 and 51.40 points).

It was found that the highest level of development of the leading indicators of QOL, which were determined during the research, was noted among representatives of the lyceum and especially the university, the lowest one was among representatives of the school, especially music school. Thus, the obtained results indicate a number of features of the development of the main characteristics of the QOL of pupils and students, which must be taken into account and applied during the development of modern health technologies.

In the course of determining the peculiarities of the PPA processes and the formation of PPF of pupils and students studying in different types of educational institutions, fairly stable results were established, which only in some cases had statistically significant differences.

In particular, when determining the peculiarities of the speed of visual-motor reaction, it was found that the best adaptive indicators of functional status of higher nervous activity of the body, characterized by the lowest values of LPSVMR and LPDVMR, were observed among boys and girls studying at the university, the worst ones belonged to boys and girls studying in school. However, statistically significant differences were found only in the case of comparing the results of research of LPSVMR obtained from boys studying at the university and school ($p_{\text{univ-school}} < 0.01$). Gender-significant differences were found only when determining the features of SVMR in boys and girls studying in a modern school ($p_{\text{boys-girls}} < 0.01$) (Table 2).

It was found that the best adaptive and significant characteristics of MNP and BNP were inherent to students studying at the university, the worst ones were among boys and girls who studied at the lyceum. Statistically significant differences were found only in the case of comparing the indicators of MNP obtained from boys studying at the university and school ($p_{\text{univ-school}} < 0.05$). However, no gender-dependent differences were observed during the study ($p_{\text{boys-girls}} < 0.05$).

Table 1

**Features of formation of leading characteristics of quality of life of pupils
and students of modern educational establishments of different types**

Quality of life indicators	Educational establishment	Groups of pupils and students				p
		boys		girls		
		n	M±m	n	M±m	
General Health (GH), points	University	30	69.56±2.38	30	64.73±2.44	>0.05
	Lyceum	30	68.86±3.57	30	62.56±4.15	>0.05
	Music school	30	63.80±2.84*	30	61.68±2.84	>0.05
	College	30	70.70±2.06*	30	64.30±2.08	<0.05
	School	30	69.23±3.50	30	62.86±3.82	>0.05
Physical Functioning (PF), points	University	30	89.83±1.47	30	84.43±1.70	>0.05
	Lyceum	30	93.00±1.30	30	86.83±1.37	<0.05
	Music school	30	92.55±2.46	30	86.54±3.40	>0.05
	College	30	92.93±1.09	30	85.56±1.97	<0.01
	School	30	92.16±1.23	30	85.10±2.34	<0.05
Role-Physical (RP), points	University	30	80.00±3.20	30	77.10±3.41	>0.05
	Lyceum	30	74.16±5.15	30	71.66±7.16	>0.05
	Music school	30	71.40±2.16	30	71.46±2.19	>0.05
	College	30	76.83±3.87	30	78.20±4.28	>0.05
	School	30	73.50±4.91	30	73.00±6.19	>0.05
Role-Emotional (RE), points	University	30	61.13±3.57	30	69.93±3.09*	>0.05
	Lyceum	30	57.00±6.19	30	54.63±7.40*	>0.05
	Music school	30	61.83±3.87	30	60.83±3.18	>0.05
	College	30	63.96±4.08	30	65.70±4.95	>0.05
	School	30	60.53±4.54	30	62.50±6.14	>0.05
Social Functioning (SF), points	University	30	54.86±3.32	30	43.13±2.73	<0.01
	Lyceum	30	50.16±2.45	30	43.86±3.14	<0.05
	Music school	30	53.16±2.70	30	43.05±2.69	<0.05
	College	30	51.86±3.29	30	45.06±3.07	>0.05
	School	30	51.43±3.51	30	43.36±2.71	<0.05
Bodily Pain (BP), points	University	30	79.00±3.08	30	76.26±2.70	>0.05
	Lyceum	30	77.23±3.58	30	78.60±4.34	>0.05
	Music school	30	77.02±2.02	30	72.04±2.84	>0.05
	College	30	78.46±3.18	30	74.46±3.41	>0.05
	School	30	78.23±3.40	30	73.00±3.92	>0.05
Vitality (VT), points	University	30	71.73±2.19	30	55.83±2.97	<0.001
	Lyceum	30	71.00±2.37	30	54.33±3.46	<0.001
	Music school	30	70.66±2.34	30	54.93±2.64	<0.001
	College	30	70.60±2.34	30	55.03±2.95	<0.001
	School	30	70.46±2.51	30	54.66±3.17	<0.001
Mental Health (MH), points	University	30	72.10±2.82	30	65.60±2.51	>0.05
	Lyceum	30	72.66±2.73	30	61.93±3.19	>0.05
	Music school	30	72.96±2.42	30	61.46±3.70	>0.05
	College	30	72.03±2.90	30	62.76±2.88	>0.05
	School	30	71.16±2.98	30	61.03±3.16	>0.05

Note: statistically significant differences between pupils and students of educational establishments of different types – * p<0.05.

Table 2

Features of formation of leading characteristics of higher nervous activity of pupils and students of modern educational institutions of different types

Indicators	Educational establishment	Groups of pupils/students				Pboys-girls
		boys		girls		
		n	M±m	n	M±m	
Latent period of simple visual-motor reaction, ms	University	30	158.23±3.12**	30	156.89±2.49	>0.05
	Lyceum	30	163.39±2.67	30	158.78±2.86	>0.05
	Music school	30	163.72±3.11	30	158,23±3.72	>0.05
	College	30	165.83±2.87	30	157.72±2.50	>0.05
	School	30	171.45±3.75**	30	159.69±2.77	<0.01
Latent period of differentiated visual-motor reaction, ms	University	30	171.15±2.06	30	166.75±2.17	>0.05
	Lyceum	30	174.03±2.43	30	167.77±2.56	>0.05
	Music school	30	173.95±3.01	30	167.23±2.31	>0.05
	College	30	173.89±2.58	30	166.85±2.74	>0.05
	School	30	174.57±2.40	30	168.31±2.11	>0.05
Mobility of nervous processes, the number of failures of differentiation reactions, ms	University	30	1.23±0.13*	30	1.40±0.17	>0.05
	Lyceum	30	2.06±0.20	30	1.76±0.21	>0.05
	Music school	30	1.73±0.19	30	1.70±0.18	>0.05
	College	30	1.50±0.14	30	1.50±0.19	>0.05
	School	30	1.63±0.02*	30	1.66±0.19	>0.05
Balance of nervous processes, error in determining the reaction to a moving object, ms	University	30	20.26±0.76	30	20.16±0.62	>0.05
	Lyceum	30	22.03±0.80	30	21.46±0.37	>0.05
	Music school	30	21.80±0.84	30	20.46±0.69	>0.05
	College	30	20.93±1.29	30	20.33±0.58	>0.05
	School	30	21.46±0.95	30	20.43±0.68	>0.05

Notes: statistically significant differences between pupils and students of educational establishments of different types – *p<0.05; **p<0.01.

It should be noted that the best adaptation characteristics and, consequently, the highest indicators of critical frequency of light flicker were recorded among both boys and girls studying at college, the worst ones belonged to schoolchildren. Significant differences were registered when comparing the results of girls who studied in school and at the university ($p_{univ-school}<0.01$), school and college ($p_{school-college}<0.01$), school and music school ($p_{school-mus.school}<0.05$), school and lyceum ($p_{school-lyc}<0.05$). Gender-related differences were observed between boys and girls studying in school ($p_{boys-girls}<0.01$).

Ultimately, the best adaptation indicators of the leading characteristics of coordination of movements were recorded among boys and girls who studied at the university, the worst ones were among schoolchildren. It should be noted that during the research there were a lot of statistically significant differences between girls who studied in school and at the university ($p_{univ-school}$), school and college ($p_{school-college}<0.05$), school and music school ($p_{school-mus.school}<0.05$), respectively. Gender-related differences were revealed between boys and girls



studying at college ($p_{\text{boys-girls}} < 0.05$), lyceum ($p_{\text{boys-girls}} < 0.05$) and school ($p_{\text{boys-girls}} < 0.05$).

The study identified the most significant relationships between the values that indicate the criteria characteristics of QOL and the peculiarities of PPA of pupils and students. The results obtained during the analysis of intrasystemic relationships between individual components of the leading characteristics of QOL based on the use of correlation analysis procedures were characterized by very interesting combinations of individual components of QOL, which differed depending on the peculiarities of the type of educational institution in which pupils or students studied. Thus, during the analysis of the peculiarities of intrasystemic relationships between the individual components of the leading characteristics of QOL of boys and girls, it was found that the smallest share of them was registered among school and lyceum pupils and university students, at the same time, the largest number was among boys and girls studying in music school and college.

It was found that the highest number of correlations of quality of life among girls was registered according to the scales of Bodily Pain, Vitality, Mental Health, General Health and Role-Emotional; at the same time, the lowest number of correlations was according to the scales of Role-Physical, Physical Functioning and, especially, Social Functioning. The highest number of correlations of quality of life among boys was registered according to the scales of Physical Functioning, Mental Health, Vitality, Bodily Pain; at the same time, the lowest number of correlations was according to the following scales: General Health, Social Functioning, Role-Physical, and especially Role-Emotional.

The data obtained during the use of cluster analysis procedures allowed to identify very interesting combinations of individual components of QOL, which differed depending on the type of educational institution where pupils or students studied.

Firstly, it should be noted that there was a separate cluster, among girls and, to a lesser extent, among boys who studied in different types of modern educational institutions, of QOL indicators, which belonged to the psychophysiological component of health and QOL indicators according to the scales of Mental Health, Vitality, Social Functioning.

Secondly, there was a separation from the two different clusters of leading characteristics of the physical component of health, which also had some gender differences. In particular, among girls, this phenomenon was most often distinguished by a cluster which included in its structure indicators of QOL according to the scales of Role-Emotional and Physical Functioning, especially among pupils who

were in the school and lyceum, as well as among the students who were in the music school, from other components, including the Bodily Pain and General Health. Thirdly, it was interesting to note that in most of the studied cases three leading cluster groups were registered, which characterized the peculiarities of intrasystem connections of the leading components of QOL, and only in the music school, their two-cluster structure was observed.

When determining the features of intersystem relationships ($r=0,37-0,99$; $p<0,05-0,001$) between individual indicators of QOL and PPF, it was found that the closest relationship was observed between such characteristics of PPA as LPSVMR, LPDVMR, MNP, BNP, CFLE and coordination of movements and indicators of QOL according to the scales of General Health, Physical Functioning, Social Functioning and Mental Health. It should be emphasized that the obtained data to a large extent the basis for the development of effective health technologies, which was highlighted in a number of scientific studies [13, 14, 15] conducted in recent years, it means that the indicators contribute to the adequate consideration of indicators of QOL and PPA should be taken into account during the formation of preventive educational process in modern educational institutions of different types.

CONCLUSIONS

1. The study revealed significant deviations ($p<0.05-0.001$) of indicators of hygienic assessment of the daily regimen of pupils and students of modern educational institutions from the generally accepted normative values concerning the characteristics of the leading forms of educational and extracurricular activities, that is particularly true for exceeding the values of the maximum allowable duration of their day stay in educational institutions, the length of time required to complete homework, the passive nature of breaks between classes, low levels of physical activity, etc.

2. It was found that the highest indicators of quality of life among both boys and girls studying in various types of educational institutions were registered according to the scales of Physical Functioning, the impact of pain on the ability to effectively perform daily activities (Bodily Pain) and the influence of physical condition on the role functioning (Role-Physical); the lowest indicators were registered according to the scales of Mental Health, Vitality, and, to the greatest extent, Social Functioning. The highest level of development of the leading indicators of quality of life was observed among the representatives of the university and lyceum, the lowest one was among the representatives of the music school and school. According to most of the studied characteristics, the indicators of quality of life (General Health, Physical Functioning, Role-Physical, Role-Emotional, Bodily Pain, Vitality, and Mental

Health) which are typical for pupils and students exceed the level of standardized population indicators established for their age. This situation requires careful consideration of the identified patterns in the development and subsequent implementation of modern health technologies, which will significantly increase their efficiency and effectiveness.

3. The results of hygienic assessment of the peculiarities of psychophysiological adaptation processes and development of psychophysiological functions of the body of pupils and students in different types of educational institutions are considered to be rather stable. Statistically significant differences were revealed only in some cases ($p < 0.05-0.01$). This situation is convincingly evidenced by the fact that the sensitive periods of development of most of the studied psychophysiological functions occur at earlier (compared to the time spent) periods. At the same time, there is a certain differentiation of the processes of development of psychophysiological functions of pupils and students as a result of the influence of peculiarities of the organization of educational activities and its professional orientation.

4. In determining the characteristics of intersystem relationships ($r = 0.37-0.99$; $p < 0.05-0.001$) between

some components of quality of life and indicators of psychophysiological functions, it was found that the closest relationship is observed between such characteristics of psychophysiological adaptation as a latent period of simple and differentiated visual-motor response, mobility and balance of nervous processes, critical frequency of light flicker and coordination of movements and quality of life indicators according to the scales of General Health, Physical Functioning, Social Functioning and Mental Health.

Contributors:

Tymoshchuk O.V. – investigation, resources, writing – original draft, project administration, funding acquisition;

Serheta I.V. – validation, data curation, writing – review & editing, supervision;

Malyshevska O.S. – conceptualization, visualization;

Melnyk V.I. – methodology;

Motriuk V.B. – formal analysis, software.

Funding. This research received no external funding.

Conflict of interests. The authors declare no conflict of interest.

REFERENCES

1. Antomonov MYu. [Mathematical processing and analysis of medical and biological data]. 2nd ed. Kyiv: Medynform; 2018. 579 p. Russian.
2. Amirdzhanova VN, Goryachev DV, Korshunov NI, et al. [Population indicators of quality of life according to the SF-36 questionnaire. Results of a multicenter study of the quality of life MIRA]. *Nauchno-prakticheskaya revmatologiya*. 2008;1:36-48. Russian.
3. Moroz VM, Makarov SYu, Serebrennikova OA, Serheta IV. [Educational stress and psychophysiological criteria for assessing the adaptation capabilities of the body of students of higher medical education institutions]. Vinnytsia: TOV "TVORY"; 2020. 184 p. Ukrainian.
4. Moroz VM, Serebrennikova OA, Serheta IV, Stoian NV. [Psychophysiological and psychohygienic bases of effective use of health-preserving technologies in institutions of higher education]. Vinnytsia: TOV "TVORY"; 2021. 208 p. Ukrainian.
5. Serheta IV, Bardov VH, Drezhenkova IL, Panchuk OIu. [Hygienic norms of motor activity of students of higher medical education institutions and ways of its optimization]. Vinnytsia: TOV "TVORY"; 2020. 184 p. Ukrainian.
6. Serheta IV, Panchuk OIu, Yavorovskiy OP. [Hygienic diagnosis of the professional suitability of students of medical education institutions (on the example of dental specialties)]. Vinnytsia: TOV "TVORY"; 2020. 348 p. Ukrainian.
7. Tymoshchuk OV, Polka NS, Serheta IV. [Scientific basis of a complex hygienic assessment of the quality of life and adaptation possibilities of modern pupils and students]. Vinnytsia: TOV "TVORY"; 2020. 272 p. Ukrainian.
8. Afsar ST. Impact of the Quality of Work-Life on Organizational Commitment: A Comparative Study on Academicians Working for State and Foundation. *Isg J Ind Relat Hum Resour*. 2015;17;45-75. doi: <https://doi.org/10.4026/1303-2860.2015.0278.x>
9. Khairunneezam MN, Siti Suriani O, Nurul Nadirah AH. Work-Life Balance Satisfaction among Academics in Public Higher Educational Sector. *Int J Acad Res Bus Soc Sci*. 2017;7:5-19. doi: <https://doi.org/10.6007/IJARBS/v7-i13/3181>
10. Cheung YB, Yeo KK, Chong KJ, Khoo EY, Wee HL. Measurement equivalence of the English, Chinese and Malay versions of the World Health Organization Quality of Life (WHOQOL-BREF) questionnaires. *Health Qual. Life Outcomes*. 2019;17;67. doi: <https://doi.org/10.1186/s12955-019-1130-0>
11. Omorou AY, Langlois J, Lecomte E, Briancon S, Vuillemin A. Cumulative and bidirectional association of physical activity and sedentary behaviour with health-related quality of life in adolescents. *Quality of Life Research*. 2016;25(5):1169-78. doi: <https://doi.org/10.1007/s11136-015-1172-7>
12. Ramon-Arbues E, Gea-Caballero V, Granada-Lopez JM, Juarez-Vela R, Pellicer-Garcia B, Anton-Solanas I. The prevalence of depression, anxiety and stress and their associated factors in college students. *Int J Environ Res Public Health*. 2020;17:7001. doi: <https://doi.org/10.3390/ijerph17197001>
13. Sanchez HM, Sanchez EG, Barbosa MA, Guimaraes EC, Porto CC. Impact of health on quality of life and

quality of working life of university teachers from different areas of knowledge. *Cien Saude Colet.* 2019;24:4111-23. doi: <https://doi.org/10.1590/1413-812320182411.28712017>

14. Singh OP, Singh SK. Quality of Work Life of Teachers Working in Higher Educational Institutions: A Strategic Approach towards Teacher's Excellence. *Int J Adv Res Comput Sci Manag Stud.* 2015;3:180-6.

15. Sjøgaard JR, Christensen JB, Justesen JB, et al. Exercise is more than medicine: the working age population's well-being and productivity. *J of Sport and Health Science.* 2016;5(2):159-65.

doi: <https://doi.org/10.1016/j.jshs.2016.04.004>

Стаття надійшла до редакції
17.05.2021

