

Original Article

**A methodology for reducing the neuro-psychic stress of students with deviations in the state of somatic health**

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**Abstract**

*Objective:* reduction of neuro-psychic stress of students with deviations in the state of somatic health; determination of the relationship between the state of neuro-psychic stress and the development of physical qualities (physical conditions) of students of a special medical group. *Material:* the SMG students (2nd year) diagnosed with excessive neuro-psychic stress participated in the experimental work. The total number of the experiment participants was 138 respondents (males - n = 68, females - n = 70). The age of the survey participants was 18-19 years. To discover the level of neuro-psychic stress at the stages of the initial, current and final control, a questionnaire by T. A. Nemchin was used. Determination of physical conditions of the SMG students in the dynamics was carried out by establishing the level of the individual physical qualities development: suppleness, coordination, and physical stamina. *Results:* After implementing the methodology, a significant number of the SMG students (61,1% of males and 62,6% of females) had a decrease in the level of neuro-psychic stress. Most of these students showed a positive shift in the development of physical qualities compared to students with excessive neuro-psychic stress (suppleness: + 45,6% of males and + 51,6% of females, coordination: + 53% of males and + 52, 3% of females; physical stamina: + 44,8% of males and + 39,9% of females). *Conclusions:* A decrease in neuro-psychic stress positively affects the development of the SMG students' physical qualities — suppleness, coordination and physical stamina. Implementation of a set of exercises for autogenic training, relaxation exercises with Swiss ball and fitness yoga is more effective in reducing the neuro-psychic stress than using typical physical exercises.

**Keywords:** social health, students, a special medical group, neuro-psychic stress, physical qualities.

**Introduction**

Over the past decades in Ukraine, the problem of saving young people's health has not been resolved. Up to this day (with slight fluctuations), there is a tendency towards the increase in the number of the first-year students who belong to a special medical group (SMG) due to the state of their health. The problem of health deterioration of young students before entering university is considered in other publications as well (Fotynyuk, 2017). Meanwhile, the presence of chronic diseases among students (of one, and in some cases two or even three systems simultaneously) often leads to a lower self-esteem, lack of confidence, a sense of inferiority, etc. In its turn, it also affects an increase in the level of neuro-psychic stress of the SMG students (Babich, 2017).

Within the framework of this research, it is important for us to investigate the interconnection between the state of neuro-psychic stress and the development of physical qualities (physical conditions) of students of a special medical group. This, in its turn, requires the development of a methodology for reducing neuro-psychic stress of the SMG students. When developing the methodology for reducing neuro-psychic stress of the SMG students, we took into account studies of foreign scientists. In particular, the research by AS. Andres. He has given an account of facts that confirm the effectiveness and importance of the priority use of physical activities, to which students have a genetic predisposition, in the educational process. The scientist has also concluded that there is a need to take into account personal characteristics of students' responses to external factors and physical activity (Andres, 2017). This is especially important, because students with significant deviations in the state of physical health (the SMG students) are respondents in our study. We have also considered the studies that note that indices of physical fitness of students are various and heterogeneous (Gainullin, Isaev, Zalyapin, Korablyova, 2017). It is advisable, in our opinion, to rely on the results of the researches that have ascertained: the need to modernize the process of physical education of young students (Shuba, 2017); the need for innovations in the field of educational technologies of students' physical education (Mykolayovych, 2016); the need to find modern technologies for the physical education of disabled students in the context of inclusive education (Adyrkhaev, 2016); the significance of developing health-applied technology of physical development of the special medical

group students (Bartnovskaya, Kudryavtsev, Kravchenko, Iermakov, Osipov, 2017); the need for individual health and applied activities of female students of a special medical group (Bartnovskaya, Kudryavtsev, Kravchenko, Osipov, Baranovskaya, Ignatova, 2017); the importance of applying an integral approach to physical education and recreation activities of students of special medical groups (Zaharova, Lyulina, 2014). We have also taken into account the scientific works devoted to the problem of monitoring the functional state of power abilities of the SMG students (Koryahin, Blavt, 2016), the study of functioning and reserves of the management system of movements of different coordination structures among the SMG female students in the process of physical education (Pryimakov, Eider, Nosko, Iermakov, 2017). The best practices in the context of strengthening the psychophysical state and psychosocial health of female students of a special medical group with the help of fitness yoga exercises are especially significant for our research (Skurikhina, Kudryavtsev, Kuzmin, Iermakov, 2016).

Results of modern tests on changes in the dynamics of physical conditions of modern youth indicate a general decrease in the indicators of development of basic physical qualities during an academic year. Accordingly, the same studies have emphasized the need for changes in the methodology of conducting physical education classes with students (Osipov, Kudryavtsev, Iermakov, Yanova, Lepilina, Plotnikova, Dorzhieva 2014). We absolutely agree with the foregoing ideas. It is worth mentioning that changes in the methodology of conducting classes (especially with the SMG students) must be introduced not only in the context of doing physical exercises, but (which is equally important) in terms of improving their (the students') psychophysical and psycho-emotional state. Since, in our opinion, development of physical qualities and increase of stability of the psycho-emotional state of the SMG students (decrease of their neuro-psychic stress) are interrelated processes.

*Hypothesis:* the authors assume that a decrease in neuro-psychic stress will increase physical conditions (development of physical qualities) of the SMG students.

In its turn, it requires:

- selection of the most optimal research methods for assessing the level of neuro-psychic stress and determining (individual) physical qualities (physical conditions);
- developing a methodology that would reduce neuro-psychic stress of students on the basis of analysis and synthesis of scientific literature;
- carry out a comparative analysis (at the final control stage) between the level of neuro-psychic stress and the level of development of physical qualities of the SMG students.

*The aim of the research is:* reduction of the neuro-psychic stress of students with deviations in the state of somatic health; determination of the interconnection between the state of neuro-psychic stress and the development of physical qualities (physical conditions) of the SMG students.

## Material and methods

*Participants.* The SMG students (2nd year) diagnosed with excessive neuro-psychic stress participated in the experimental work. The total number of the experiment participants in was 138 respondents (males - n = 68, females - n = 70). The age of the survey participants was 18-19 years.

To establish the level of neuro-psychic stress at the stages of the initial, current and final control, a questionnaire by T. A. Nemchin was used. Determination of physical conditions of the SMG students in the dynamics was carried out by establishing the level of development of individual physical qualities. Taking into account the specificity of the SMG students (namely, the presence of deviations in the state of their physical health), such physical qualities were chosen to assess physical conditions, as: suppleness, coordination and physical stamina. At the same time, we tried to find such tests that would not require the maximum or submaximal loads on to the students (in order to avoid complications of their diseases).

Taking into account everything mentioned above, the level of development of such physical quality as *suppleness* was determined by bending the vertebral column when leaning forward seated on a gymnastic bench.

*Coordination of movements* was determined by throwing and catching a ball (15 cm in diameter) with two hands at a distance of 1 m from the wall for 30 seconds. The number of the balls caught was counted (students with myopia and other visual impairments did not take part in this test).

*Physical stamina* was measured by squatting down, which was performed at a slow pace up to fatigue. The number of squares performed was counted (Yazlovetsky, 2002). Only the SMG students who had received a permission from the doctor did the exercise described above.

**Organization of researches.** Students of Chernihiv National University of Technology, State Institution "Luhansk Taras Shevchenko National University", Starobilsk (Ukraine) and the Institute of Chemical Technologies of Volodymyr Dahl East Ukrainian National University, Rubizhne, (Ukraine) took part in the experiment.

In order to reduce neuro-psychic stress, we developed an appropriate technique that consisted of three stages and included a set of exercises (autogenic training exercises, Swiss ball and fitness yoga exercises aimed at muscle relaxation).

**At the first stage** (September-October, 2017) from the first up to the sixth week, the students (at the beginning of a class) did an autogenic training for 4-6 minutes. At this stage, the psychosomatic training (an autogenic training) was performed when reclining. At the beginning, the students used a shortened version of the psycho-muscle training consisting of six formulae: 1) I relax and calm down; 2) my hands are relaxed, warm, immobile; 3) my legs are completely relaxed, warm, immobile; 4) my body is completely relaxed, warm, immobile; 5) my neck is completely relaxed, warm, immobile; 6) my face is completely relaxed, warm, immobile (Zhabokrytska, 2004). The formation of mobilization readiness for physical activity was the main element of the final part of the autogenic training. The greatest importance was attached to the mobilizing verbal formulae, which influence the consciousness and improve the psychophysical state of a person. The students uttered the following phrases: 1) the sense of gravity and relaxation disappears in all muscles; 2) all muscles are light, elastic, strong; 3) I become more cheerful; 4) I open my eyes; 5) I am extremely concentrated; 6) I am very excited; 7) I am full of energy; 8) I am fully mobilized; 9) I have to succeed; 10) I am ready to act; 11) I am doing the task.

**At the second stage** (October-November, 2017), from the seventh up to the tenth week, according to the methodology we had developed (in the introductory part of the lesson), the students did:

- autogenic training exercises in the "coach" position to maximize relaxation of muscles of the back and hips. The time of the exercise performance was prolonged up to 8 minutes;
- exercises with Swiss ball (exercises with a big ball - 65 cm) aimed at relaxation: 1) *lying with one's back on the ball (0,3 - 2 min.);* 2) *lying flat on one's back (on a mat), calves are on the ball (0,3 - 2 min.);*
- fitness yoga exercises aimed at relaxation (among which there is an exercise, which has heels as a starting position. It is necessary to stretch oneself forward, relaxing one's back, hands forward, palms down. Duration of the exercise - up to 40 sec.).

**At the third stage** (November-December, 2017) from the eleventh up to the fourteenth week, according to the methodology developed by us (except for the Swiss ball exercises used at the second stage), the students performed:

- additional exercises with Swiss ball aimed at relaxation (*laying on the ball with the left and right sides alternately (1-2 min.). In order to trigger a sense of relaxation, the students performed slow jumps sitting on the ball (2-3 min.);*
- the autogenic training was performed flat on the back (arms slightly curved in the elbows, palms down, legs positioned shoulder width apart). The duration prolonged up to 10 minutes.

Within the framework of the methodology suggested, the students were also offered a different approach to assessing physical fitness (by determining at least minimal progress in the development of physical qualities). This is due to the two main factors:

- 1) deviations in the state of somatic health of the SMG students;
- 2) the need to create a stimulating factor, which, in its turn, would also contributed to a decrease in psycho-emotional stress.

Thus, within the framework of this experiment, the degree of positive changes in the context of increasing physical conditions of the SMG students was determined by the presence of any progress in the development of physical qualities (suppleness, coordination, physical stamina) of the students.

**Mathematical and statistical processing.** To compare the frequency distribution between boy-students and girl-students Pearson's chi-squared test  $\chi^2$  was used. It allows juxtaposing two empirical distributions and concluding if they are consistent with each other.

where  $N_{ij}$  - empirical frequency,

$N_{ij}^0$  — the oretical frequency, which is calculated as  $N_{ij}^0 = \frac{1}{N} N(x_i)N(y_j)$ ,

$N(x_i)$ — marginals (totals) by  $X$ ,  $N(y_j)$  — by  $Y$ ,

$N$  — the total number of objects,

$k$  — the number of table rows,

$l$  — the number of columns.

The value  $f = (k - 1)(l - 1)$  is called the number of degrees of freedom of the correlation table.

The critical value of Pearson's chi-squared test  $\chi_0^2$  ( $f=2, p \leq 0,05$ ) is 5,99; the critical value of Pearson's chi-squared test  $\chi_0^2$  ( $f=2, p \leq 0,01$ ) is 9,21; the critical value of Pearson's chi-squared test  $\chi_0^2$  ( $f=2, p \leq 0,001$ ) is 13,81.

## Results

A questionnaire on neuro-psyhic stress by T. A. Nemchin was used to select the SMG students with excessive neuro-psyhic stress who took part in the experiment. The use of tests (indicated in the Material and methods section) allowed to discover that only 14,9% of males and 25,8% of females (with excessive neuro-

psychic stress) during the study period had made progress (at least minimal) in the development of a physical quality — *suppleness*. Moreover, 25,2% of male students and 19,5% of female students had regressions in this context (there was a decrease in suppleness when bending the vertebral column seated on a gymnastic bench). In terms of the physical quality of *coordination*, 18,2% of boys and 15,3% of girls had positive progress. Positive shifts regarding the physical quality of *physical stamina* were shown by 24,4% of boys and 13,8% of girls.

The results obtained after the methodology introduced by us (which involves doing a complex of exercises of autogenic training, exercises with Swiss ball and fitness yoga aimed at relaxation, in physical education classes) showed:

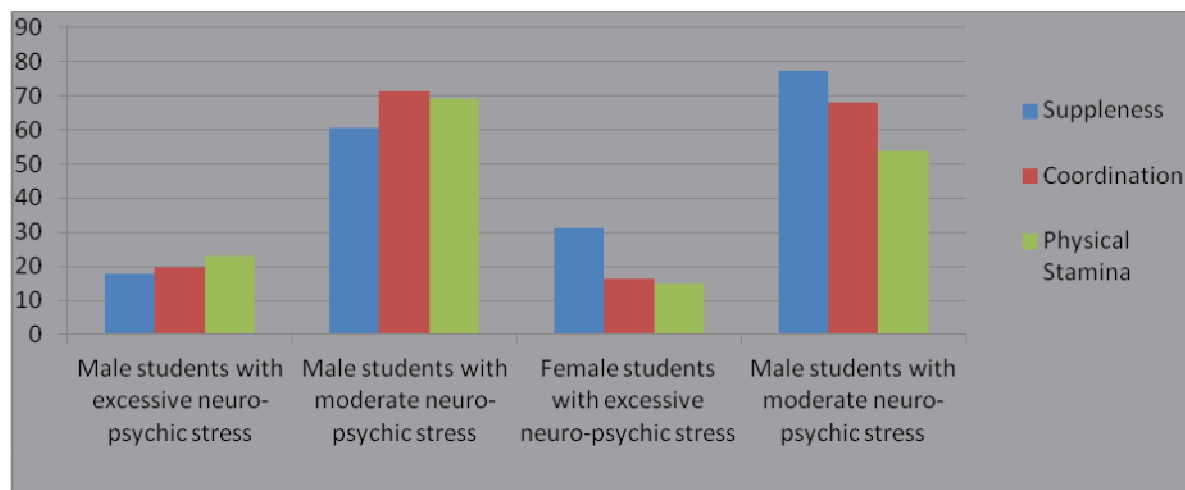
1) Reducing the number of the SMG students (65,8% males and 71,4% females) with excessive neuro-psychic stress.

2) The testing of students (at the final control stage) who had a reduced level of neuro-psychic stress showed the following: 60,5% of male students and 77,4% of female students had progress in the development of a physical quality — suppleness; 71,2% of males and 68,1% of females had progress in the development of such a physical quality as coordination; 69,2% of male students and 53,7% of female students had improved physical stamina.

3) In contrast, the SMG students (both males and females) who had no decrease in the level of neuro-psychic stress had the indicators of the physical qualities development almost unchanged. We noticed slight fluctuations (progress or regression) of the physical qualities we had selected. The dynamics of development of such a physical quality as "suppleness" (the presence of minimal progress) was set at the level: + 17,8% for males; + 31,2% for females. The development dynamics of "coordination" was: + 19,8% for males; + 16,4% for females. The dynamics of development of such a physical quality as "physical stamina" was set at the level: + 23,1% for males; + 14,9% for females.

Thus, the number of students who (the reduction in neuro-psychic stress was recorded after the implemented methodology) showed a positive shift (progress) in the development of physical qualities is higher than the number of students (with progress) with excessive neuro-psychic stress (suppleness: + 45, 6% for males and + 51,6% for females; coordination: + 53% for males and + 52,3% for females; physical stamina: + 44,8% for males and + 39,9% for females).

With the help of the diagram (Diagram 1), we can see significant differences between the number of students (both males and females) in development of all (studied within our experiment) physical qualities (suppleness, coordination, physical stamina).



#### Diagram

Comparison of value characteristics of the physical qualities development of the SMG students with excessive and moderate neuro-psychic stress.

A comparative analysis of the number of students (who had progress in development of physical qualities) with excessive neuro-psychic stress and those who had decrease in such a stress, showed that the empirical value of Pearson's chi-squared test  $\chi^2$  exceeds the critical value of 5,99. Thus, the difference between the students with excessive neuro-psychic stress and students with moderate neuro-psychic stress in terms of the physical qualities development (suppleness, coordination, physical stamina) in favour of the students with moderate neuro-psychic stress is significant at the level of  $p < 0,05$ .

In its turn, this confirms our assumption that reducing neuro-psychic stress will increase the physical conditions (development of physical qualities) of the SMG students.

We can also state that there are some differences between male students and female students (who had decrease in the level of neuro-psychic stress) in terms of progress in development of one or another physical quality. Meanwhile, they are not significant (from 0,2% up to 6%). The female students have advantage over the

males in suppleness development (+ 6%). The boys are ahead of the girls in terms of physical stamina development (+ 4,9%). It is clearly visible in the diagram (Diagram 1). If the male students (who had decrease in the level of neuro-psychic stress) had made almost similar progress in the development of such physical qualities as coordination and physical stamina (somewhat fewer students had progress in developing suppleness), the females had greater differences among the data on the progress in the development of the physical qualities mentioned above in the following order (from the top indicators to the lowest ones) — suppleness, coordination, physical stamina. Meantime, the discrepancies regarding progress in the development of physical qualities between the male students and the female students can be explained by the physiological characteristics of boys and girls and, accordingly, their natural ability to develop one or another physical quality.

### Discussion

The obtained research results confirm the close connection of neuro-psychic stress of the SMG students and the level of development of their physical qualities (suppleness, coordination, physical stamina). Analysis of the data obtained (in the course of the experiment) shows the proportional increase in the number of the students who had decrease in neuro-psychic stress and the number of the students who had progress (at least minimal) in the physical qualities development of (with a slight advantage of young men in terms of physical stamina and girls' superiority in suppleness).

The results we have obtained (regarding the interconnection of neuro-psychic stress and the increase of physical conditions of the SMG students) fully correlate with other studies. Contemporary domestic and foreign scientists (Skurikhina, Kudryavtsev, Kuzmin, Iermakov) have proved the positive influence of fitness yoga on the psycho-emotional state of female students, general physical state and physical development.

According to the results of this study, the female students (after implementation of fitness yoga) had an increase in lumbar-spine mobility ( $p < 0,05$ ). In addition, higher results were observed in the number of push-ups within 30 seconds ( $7,34 + 1,2$  times more) and in standing long jumps ( $14,2 + 0,4$  cm) (Skurikhina, Kudryavtsev, Kuzmin, Iermakov, 2016). That is, we observed both improvement of the psycho-emotional state of the SMG female students and their physical condition. Our research has not only confirmed the conclusions of the above-mentioned authors, but also has shown the direct interconnection between the state of neuro-psychic stress and the level of development of physical qualities (suppleness, coordination, physical stamina) of young students.

The methodology for reducing neuro-psychic stress (and, consequently, increasing physical conditions of the SMG students) introduced by us also was based on the results of other studies (Kudryavtsev, Kramida, Iermakov, Osipov, 2016). According to them, more attention in physical education classes must be paid to the development of students' emotional stability. We used autogenic training, as well as relaxation exercises (Swiss ball and fitness yoga) during physical education classes based on the researches that state that the systematic alternation of relaxation and muscle tension positively affects the reduction of anxiety of children and adults (Zhabokrytska, 2004).

The additional influence over the decrease in the psycho-emotional stress of the SMG students (males and females) was caused by the implementation of a new approach to assessing the students' physical fitness, which is common in European countries. It presupposed at least minimal progress in the development of physical qualities of the students. It also was a stimulating factor for the students and increased their self-confidence. This approach is based on researches by V. Yazlovetsky. According to the scientist, changes in the physical conditions of the SMG students depend in many ways on assertiveness, initiative and enthusiasm of students, their interest in the development of functional capabilities of their body (Yazlovetsky, 2002).

Similar conclusions have been drawn by domestic and foreign scientist (Osipov, Kudryavtsev, Iermakov, Yanova, Lepilina, Plotnikova, Dorzhieva, 2017). They emphasize the lack of motivation of students for physical education classes. This requires new ways to stimulate students in this context. OG.Lachno, when studying the effectiveness of various methods of conducting physical education classes for students (the main medical group), also stressed the importance of increasing the students' motivation (Lachno, 2015). Our approach to assessing physical fitness of the SMG students by defining progress in the development of physical qualities was also based on modern studies of foreign scientists. According to them, one of the key ways of influencing students should correspond to the humanistic principle of "to encourage, not to force" (Kondakov, Kopeikina, Balysheva, Usatov, Skrug, 2015). That is, in our case to stimulate students to do physical exercises more actively (in classes and in the process of independent work). This was realized due to the fact that all the students gained self-confidence in his/her own ability to improve his/her physical conditions.

### Conclusion

The interconnection between the state of neuro-psychic stress of the SMG students and development of their physical qualities has been established. A decrease in neuro-psychic stress positively influences the development of the SMG students' suppleness, coordination, and physical stamina.

It has been found out that the methodology proposed by us (which involves doing a set of exercises for autogenic training, relaxation exercises with Swiss ball and fitness yoga in physical education classes helps to reduce the number of young students with excessive neuro-psychic stress.

It has been discovered that the decrease in neuro-psychic stress in different ways influences progress in the development of physical qualities of male and female students (with minor benefits in favour of the males).

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