

**MENTAL ENLIGHTENMENT SCIENTIFIC –
METHODOLOGICAL JOURNAL****MENTAL ENLIGHTENMENT SCIENTIFIC –
METHODOLOGICAL JOURNAL**<http://mentaljournal-jspu.uz/index.php/mesmj/index>**SCIENTIFIC BASIS FOR THE ASSESSMENT OF THE PSYCHOPHYSIOLOGICAL
STATUS OF STUDENTS WITH PHYSICAL DISABILITIES****Sunnatilla Berdiyev***Independent researcher**Institute of Physical Education and Sports Research*sunnatilladilmurod1992@gmail.com*Tashkent, Uzbekistan*

ABOUT ARTICLE

Key words: Students with physical disabilities, nosology, athletes, disability, psychophysiological state, adaptive sports, Paralympic movement, coordination, functional state, psycho-emotional state.

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Abstract: The indicators of the psychophysiological state of students with physical disabilities were studied. During the experiment, a comprehensive set of methods was applied, including special exercises aimed at developing sensorimotor coordination, speed-strength exercises designed to activate the neuromuscular system, workloads aimed at improving functional endurance, and psychoregulation techniques. In this study, athletes from the control group trained according to the traditional training program that had been used in practice throughout the experimental period. During the training process, the specially developed adaptive management model, the mechanism for correcting individual workloads, and the psychophysiological monitoring system were not applied. Therefore, the changes observed at the end of the pedagogical experiment were assessed as results formed under the influence of the natural training process.

Introduction. The rapid development of adaptive sports worldwide, the increasing participation of persons with disabilities in sports activities, and the expansion of the international Paralympic movement have intensified the need for a scientifically grounded approach to the training of athletes with disabilities. In modern para sports, achieving high

athletic performance is scientifically recognized as being directly dependent not only on athletes' general and sport-specific physical fitness but also on the functional state of the central nervous system, sensorimotor coordination, neuromuscular control, functional adaptation mechanisms, and the optimal development of psychophysiological processes.

Purpose of the study. To scientifically investigate the psychophysiological and functional processes occurring in students with physical disabilities during sports activities.

Materials and Methods. According to the theory of sports training, regular training can lead to natural positive changes in certain physical and functional indicators of athletes. However, the rate and magnitude of these changes largely depend on the training methodology, the degree of individualized training loads, continuous monitoring of the athletes' functional status, and the scientific management of the training process. When training is conducted according to a standardized program, individual characteristics of athletes may not be sufficiently taken into account. As a result, although improvements may be observed in certain indicators, most of these changes do not reach a statistically significant level.

In this study, athletes in the control group participated in training sessions based on the traditional training program that has been used in practice throughout the experimental period. During the training process, the specially developed adaptive management model, the mechanism for the experiment, a comprehensive set of methods was applied, including special exercises aimed at developing sensorimotor coordination, speed-strength exercises designed to activate the neuromuscular system, training loads individual correction of training loads, and the psychophysiological monitoring system were not applied. Therefore, the changes observed at the end of the pedagogical experiment were assessed as outcomes formed under the influence of conventional training.

Results and discussion. During the experiment, a comprehensive set of methods was applied, including special exercises aimed at developing sensorimotor coordination, speed-strength exercises designed to activate the neuromuscular system, training loads intended to improve functional endurance, and psychoregulation techniques. Such an integrated structure of the training process made it possible to influence athletes' preparedness through several functional systems simultaneously.

Dynamics of Psychophysiological Status Indicators in Students with Disabilities in the Control Group Before and After the Pedagogical Experiment (n=20)

T/ r	Indicators	Beginning of the experimen t ($\bar{X} \pm \sigma$)	V, %	End of the experimen t ($\bar{X} \pm \sigma$)	V, %	t	P
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Psychophysiological Indicators							
1	Simple Reaction Time (ms)	292±35	12,0	286±33	11,5	1,32	>0,05
2	Complex Reaction Time (ms)	429±52	12,1	421±49	11,6	1,41	>0,05
3	Attention Stability (score)	7,31±0,91	12,5	7,54±0,83	11,0	2,14	<0,05
Sensorimotor Coordination							
4	Eye-Hand Coordination (ball)	7,05±0,89	12,6	7,33±0,80	10,9	2,25	<0,05
5	Movement Accuracy (ball)	7,22±0,87	12,1	7,46±0,79	10,6	1,74	>0,05
6	Balance Control (s)	18,1±2,50	13,8	18,9±2,33	12,3	1,65	>0,05
Neuromuscular System							
7	Handgrip Strength (kg)	39,0±5,20	13,3	40,3±4,84	12,0	2,08	<0,05
8	3 kg Medicine Ball Throw Distance (m)	4,48±0,59	13,2	4,63±0,53	11,4	1,56	>0,05
9	Number of Hand Movements in 30 Seconds (repetitions)	45,5±5,50	12,1	47,1±5,18	11,0	1,83	>0,05
Functional Condition							
10	Heart Rate (beats/min)	77,3±8,30	10,8	76,5±7,95	10,4	1,21	>0,05
11	Systolic Blood Pressure (mmHg)	123,0±12,80	10,4	122,2±12,00	10,0	0,88	>0,05
12	6-Minute Wheelchair Propulsion Distance (m)	598±75	12,5	611±68	11,1	1,94	>0,05
Psycho-Emotional State							
13	Sport Motivation (points)	7,43±0,94	12,7	7,66±0,84	11,0	1,98	>0,05
14	Level of Anxiety (points)	4,40±0,58	13,2	4,28±0,52	12,1	1,42	>0,05
15	Emotional Stability (points)	7,15±0,85	11,9	7,36±0,77	10,5	1,67	>0,05

The handgrip strength, which characterizes the functional state of the neuromuscular system, increased from 40.3±5.18 kg to 42.1±5.12 kg, with a statistically significant difference observed ($t=2.19$; $P<0.05$). These findings indicate that regular strength training contributed to a certain improvement in the functional capacity of the upper body muscles.

However, although the number of maximum hand movements performed within 30 seconds increased from 45.7 ± 5.46 repetitions to 47.2 ± 5.21 repetitions, no statistically significant difference was observed ($t=1.71$; $P>0.05$). This indicates the need for additional specialized training aimed at developing speed-strength endurance.

**Dynamics of Psychophysiological Status Indicators in Students with Disabilities
in the Experimental Group Before and After the Pedagogical Experiment (n=20)**

T/r	Indicators	Beginning of the experiment ($\bar{X} \pm \sigma$)	V, %	End of the experiment ($\bar{X} \pm \sigma$)	V, %	Δ %	t	P
Psychophysiological Indicators								
1	Simple Reaction Time (ms)	286 ± 33	11,5	248 ± 29	11,7	-13,3	5,82	<0,001
2	Complex Reaction Time (ms)	421 ± 50	11,9	369 ± 42	11,4	-12,4	5,37	<0,001
3	Attention Stability (score)	$7,42 \pm 0,89$	12,0	$8,86 \pm 0,95$	10,7	+19,4	4,84	<0,001
Sensorimotor Coordination								
4	Eye-Hand Coordination (ball)	$7,18 \pm 0,86$	12,0	$8,81 \pm 0,93$	10,6	+22,7	5,21	<0,001
5	Movement Accuracy (ball)	$7,35 \pm 0,84$	11,4	$8,73 \pm 0,96$	11,0	+18,8	4,56	<0,001
6	Balance Control (s)	$18,6 \pm 2,30$	12,4	$24,8 \pm 2,73$	11,0	+33,3	6,43	<0,001
Neuromuscular System								
7	Handgrip Strength (kg)	$39,8 \pm 5,00$	12,6	$46,5 \pm 5,35$	11,5	+16,8	4,98	<0,001
8	3 kg Medicine Ball Throw Distance (m)	$4,62 \pm 0,56$	12,1	$5,48 \pm 0,60$	10,9	+18,6	4,62	<0,001
9	Number of Hand Movements in 30 Seconds (repetitions)	$46,3 \pm 5,20$	11,2	$55,8 \pm 6,14$	11,0	+20,5	5,06	<0,001
Functional Condition								
10	Heart Rate (beats/min)	$76,4 \pm 8,00$	10,5	$71,2 \pm 7,48$	10,5	-6,8	3,42	<0,01
11	Systolic Blood Pressure (mmHg)	$121,6 \pm 12,40$	10,2	$118,1 \pm 13,12$	11,1	-2,9	2,54	<0,05
12	6-Minute Wheelchair Propulsion Distance (m)	612 ± 72	11,8	688 ± 76	11,0	+12,4	4,36	<0,001

Psycho-Emotional State								
13	Sport Motivation (points)	7,56±0,91	12,0	8,92±0,95	10,6	+18,0	4,71	<0,001
14	Level of Anxiety (points)	4,32±0,55	12,7	3,41±0,45	13,2	-21,1	4,28	<0,001
15	Emotional Stability (points)	7,28±0,82	11,3	8,71±0,93	10,7	+19,6	4,93	<0,001

The balance maintenance indicator increased from 18.6±2.30 seconds to 24.8±2.73 seconds ($t=6.43$; $P<0.001$). This demonstrates that adaptive exercises had a positive effect on athletes' postural stabilization, proprioceptive sensitivity, and ability to control movements.

At the end of the experiment, handgrip strength increased from 39.8±5.02 kg to 46.5±5.35 kg ($t=4.98$; $P<0.001$). This result indicates that specialized strength exercises targeting the upper body muscles are effective in improving the maximum muscular strength of athletes.

The obtained results confirmed that the comprehensive methodology incorporating psychophysiological monitoring, individual correction of training loads, sensorimotor exercises, psychoregulation techniques, and adaptive management principles is more effective compared to the traditional training system. It was experimentally proven that this methodology contributes to the comprehensive improvement of athletes' central nervous system activity, movement control accuracy, neuromuscular system function, functional capacity of the body, and psycho-emotional stability.

Thus, the results of the pedagogical experiment confirmed the validity of the scientific hypothesis proposed in the study and substantiated the scientific and practical effectiveness of the developed comprehensive methodology and the adaptive management model of psychophysiological processes in students with disabilities. These findings fully confirm the scientific novelty and practical significance of the dissertation and can be considered as a scientific and methodological foundation contributing to the improvement of the training system for para athletes.

Conclusion. The obtained scientific results demonstrated that the developed comprehensive methodology is not limited to the development of specific physical qualities of athletes but also ensures the integrated improvement of the central nervous system function, sensorimotor coordination, neuromuscular system, cardiovascular system, and psycho-emotional stability. This scientifically substantiated the superiority of a comprehensive approach in managing the training process of para athletes compared with the traditional training system.

Thus, the results of the pedagogical experiment experimentally proved the complete confirmation of the scientific hypothesis proposed in the study, demonstrating that the developed comprehensive methodology, adaptive load management technology, and the “Adaptive Management Model of Psychophysiological Processes in Students with Disabilities” represent a scientifically grounded mechanism for improving the effectiveness of para athletes’ training. These results fully confirm the scientific novelty of the dissertation, contribute to the enrichment of the theory and methodology of managing the psychophysiological preparation of students with disabilities through new scientific solutions, and provide a strong scientific and methodological foundation for their effective implementation in para sports practice.

It is recommended to introduce specialized educational modules on adaptive management, psychophysiological monitoring, and the management of individualized training of para athletes into professional development courses for coaches and sports specialists, as well as into master's and doctoral programs of higher education institutions.

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