

EFFECTIVENESS OF THE PILOT PROGRAM CORRECTION PSYCHOPHYSICAL CONDITION OF CHILDREN IN THE SECOND YEAR OF A COMMON EDUCATIONAL SCHOOL

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Annotation. *Purpose:* the algorithms have been defined and grounded that contain projecting operations for the formation and implementation of a programme aiming at the correction of psychophysical state of children in the process of physical education during the second year of studying at school. In the investigated was attended by 19 girls and 15 boys second class of experimental group and 30 girls and 30 boys in the control group. *Results:* it is shown that the increase in body weight of 2.4% in girls and 3.9% boys, increase in body length 14.7% of girls and 11.5% boys, vital capacity of the lungs 22% and 21.8%, respectively, in the muscle strength by dynamometry results brushes right and left hands grew by 142.4 and 94.8%, revealed a significant (from $p < 0.05$ to $p < 0.001$) improved values of all investigated parameters of physical fitness girls and boys. *Conclusions:* use within one year of the proposed development of 19 girls and 15 boys achieved the much better results in solving tasks than the traditional organization and content of physical education, which are used in the control group.

Key words: second year pupils, psychophysical, correction, physical, education.

Introduction

At present stage one of the most important tasks of physical education at second year of children's studying in comprehensive educational establishment (CEE) – is their rational adaptation to new conditions of educational activity. It is connected with the fact that just with starting of second year of studying regime of the mentioned functioning changes from that, which is intrinsic to pre-school educational establishment (first year of studying at CEE) to regime, characteristic for older pupils [1]. Such change stimulates children's appropriate adaptation responses, but in most cases, in connection with absence of systems' readiness, these responses take place in stress forms [4, 10, 15, 16]. That is why studying of psycho-physical state of second form pupils is an urgent task for working out of organism's rational adaptation technologies for enduring of high teaching loads and prevention from their negative influence on health and other indicators of psycho-physical state.

Teaching and education of junior schoolchildren is one of the most important problems of modern educational system in Ukraine, because just in this period foundations of physical, mental, intellectual and creative development of a child are formed, see National doctrine of development of education in Ukraine in 21st century (Ukrainian educational server <http://ues.org.ua>: 8100. 2001). Special place in this period is taken by second year of studying and one of reasons of it – is the mentioned above transition of children to new regime of teaching load, i.e. regime of teaching and rest at CEE. In case if such transition has stressful character, negative after effects often occur, in particular in general development of a child, his (her) health, in different functional and psychological indicators, especially is they are lower than age standards [9].

In connection with the latter, statistic [12] witnesses that recent five years have had the trend to annual increasing of primary school pupils with different somatic and psychic disorders, while different indicators in 80% of cases do not comply with age standards. First of all it concerns disharmonious character of general development, reducing of biological development rates, reducing of physical activity, functional abilities, rising of chronic tiredness of primary school pupils in general and second form pupils in particular. The problem becomes deeper also owing to the fact that pedagogic process of the latter is overloaded with academic disciplines, i.e. facilitates only progressing of intellect [11]. With it influence of child's way of life on studying practically is not considered [3] that is one of main factors of risk of diseases; life style determines child's health by 51% [13].

One of leading places in child's life style is taken by physical functioning; it is becoming an integral part of life style, first of all in connection with its efficiency in improving of psych-physical indicators [2]. Methodological aspects and ways to increasing of effectiveness of primary school pupils' physical education have been elucidated in great number of scientific works, which can be classified by the following directions: formation of conception of physical education; review of criteria of the process's effectiveness; improvement of its normative basis; foundation of health related physical culture trainings' content; organizational-methodic provision of such trainings [6]. One of most important directions of foreign researching at present is formation of strategy of pupils' physical education [14]. At the same time there are very little of works [5; 7], devoted to mental workability of primary school pupils for optimization of their study-rest regime. Till now there is no works on correction of children's psycho-physical correction in the process of physical education for improvement of mental workability without negative after effects for health or mental state. It is specially important because this state changes everyday during academic year at second form of CEE and it conditioned the urgency of the present research.

The research has been fulfilled as per combined plan of scientific & research works in sphere of physical culture and sports for 2006-2010 of ministry of Ukraine of family, youth and sports by topic 3.1.1 "Theoretical methodic and program-normative principles of pupils' and students' physical education" (state registration number

0107U000771), in compliance with plan of scientific-research work of physical education faculty of Ternopil national pedagogic university, named after Volodymyr Gnatiuk for 2011-2014 by topic "Theoretical-methodic principles of extra-curriculum forms of children's and students' physical education".

Purpose, tasks of the work, material and methods

The purpose of the work is to experimentally ground effectiveness of the worked out program for correction of second form pupils psycho-physical state in the process of physical education.

The methods and organization of the research were used the following: general scientific (analysis, generalization) pedagogic (testing, formation experiment), medical-biological (anthropometry, spirometry, dynamometry, pulse-metering), methods of mathematical statistic.

During academic year we applied the worked out program (experimental group (EG) of girls (g) 19 persons and boys (b) – 15 persons and traditional organization and content of physical education at CEE in control group (CG) 60 girls and 60 boys for second form pupils. At the beginning and at the end of academic year we measured morphological functional indicators (length and mass of body, vital capacity of lungs (VCL) heart beats rate (HBR) in rest and after dozed load, after 45 seconds of rest as well as indices: power (PI), VI- vital index, index Ruffiet (IR). For studying of physical fitness we used the following tests: absolute muscular strength – hand dynamometry; speed power – 20 meter run,; explosive power – long jump from the spot; mobility of lumbar spine – forward bent in sitting position; shoulder joints – twisting of rule behind back; coordination in cyclic motions – shuttle run 4x9 meters, ballistic movements – throwing of tennis ball for distance; acrobatic movements – three forward roll-overs. Somatic health was evaluated by quantity of missed because of diseases classes, considering recommendations [8]: "0 points" – high level, "1-3" –middle, "4 and more" – low level.

Conclusions about applied program, were made after comparing of data, obtained from experimental and control groups in compliance with criterion of quantity of analyzed indicators, values of which during experiment substantially (at level from $p < 0,05$ to $p < 0,001$) changed.

Results of the research

Quantity of indicators, value of which substantially changed by the end of experiment. Girls. Comparison of morphological functional indicators of EG at the beginning and at the end of experiment did not show any negative change of any indicators (see table 1).

Table 1

Dynamic of second form (CEE) girls' indicators of physical condition at stages of formation experiment

Indicator	Group	At beginning		At end		CXhange($\bar{x}_1 - \bar{x}_2$)		t_1 ($\bar{x}_1 - \bar{x}_2$)	t_2 (EG- CG; $\bar{x}_2 - \bar{x}_2$)
		\bar{x}_1	m	\bar{x}_2	m	absolute	%		
<i>Morphological-functional</i>									
Body mass, kg	EG	24.5	0.61	28.1	0.57	3.6	14.7	4.31***	0.9
	CG	24.9	0.67	27.3	0.68	2.4	9.6	2.51*	
Body length, cm	EG	125.1	0.74	128.1	0.67	3.0	2.4	3.01**	0.43
	CG	125.8	0.70	128.5	0.64	2.7	2.1	2.82*	
VCL, ml	EG	1115.3	28.7	1360.5	24.3	245.2	22.0	6.52***	6.71 ***
	CG	1125.2	33.41	1106.7	29.00	-18.5	-1.6	0.42	
HBR in rest, b.p.m. ⁻¹	EG	86.1	0.97	79.1	0.75	-7.0	8.1	5.71***	3.51 **
	CG	85.2	1.53	83.8	1.11	-1.4	1.6	0.74	
HBR after physical load,, b.p.m. ⁻¹	EG	126.3	1.50	114.4	1.21	-11.9	9.4	6.17***	4.66 ***
	CG	125.5	1.89	123.1	1.42	-2.5	2.0	1.04	
HBR at 45 sec of rest, b.p.m. ⁻¹	EG	89.1	1.31	82.4	0.62	-6.7	7.5	4.62***	4.95 ***
	CG	88.7	1.76	90.3	1.47	1.6	-1.9	0.73	
Power index (PI), %	EG	16.3	1.45	44.1	2.15	27.8	170.6	10.7***	2.59 *
	CG	16.0	1.76	35.9	2.32	19.9	124.7	6.84***	
Index Ruffiet (IR), conv. Un.	EG	10.2	0.35	7.6	0.25	-2.6	25.5	6.04***	5.27 ***
	CG	9.9	0.44	9.7	0.31	-0.2	2.2	0.41	
Vital index (VI) ml.p.kg ⁻¹	EG	45.5	1.55	48.4	0.95	2.9	6.4	1.6	4.87 ***
	CG	46.3	1.61	41.4	1.08	-4.9	-10.6	2.54*	
<i>Physical fitness</i>									
Shuttle run 4x9 m, sec	EG	13.6	0.15	12.3	0.08	-1.3	9.6	7.65***	3.93 **
	CG	13.5	0.22	12.9	0.13	-0.6	4.7	2.51*	
Throw for distance with main arm, m	EG	6.2	0.27	11.2	0.21	5.0	80.7	14.6***	9.57 ***
	CG	6.3	0.31	8.0	0.26	1.7	26.6	4.14***	
Three forward roll overs, sec.	EG	6.2	0.15	5.1	0.10	-1.1	17.7	6.1***	2.77 *
	CG	6.2	0.19	5.6	0.15	-0.6	9.4	2.35*	

Long jump from the spot, cm	EG	105.1	1.80	121.5	1.42	16.4	15.6	7.15***	3.07
	CG	104.5	2.40	112.9	2.41	8.4	8.1	2.48*	**
Forward bent in sitting position, cm	EG	5.8	0.5	9.2	0.7	3.4	58.6	3.95***	3.01
	CG	5.9	0.59	5.4	1.05	-0.5	-8.3	0.41	**
Twisting of rule behind back, cm	EG	60.1	1.02	50.4	1.12	-9.7	16.1	6.4***	5.79
	CG	58.5	1.17	61.0	1.45	2.5	-4.2	1.32	***
20 meters straight off run, sec.	EG	5.1	0.12	4.2	0.06	-0.9	17.7	6.71***	4.71***
	CG	5.0	0.11	4.6	0.06	-0.4	8.6	3.39**	
Hand dynamometry of main arm, kg	EG	4.1	0.38	12.4	0.25	8.3	202.4	18.3***	4.04
	CG	4.0	0.44	9.7	0.62	5.7	142.4	7.47***	***
Hand dynamometry of weaker arm, kg	EG	3.8	0.41	10.6	0.32	6.8	179.0	13.1***	4.47
	CG	3.9	0.47	7.6	0.59	3.7	94.8	4.84***	***
<i>Somatic health</i>									
1 st semester, days	EG	3.8	0.52	-	-	-	-	-	0.13
	CG	3.7	0.58	-	-	-	-	-	
2 nd semester, days	EG	-	-	2.1	0.47	-	-	-	3.23
	CG	-	-	4.8	0.69	-	-	-	*
Total:	EG	-	-	5.9	0.5	-1.7	44.7	2.43*	2.05
	CG	-	-	8.5	1.27	1.1	-29.7	1.22	*

Notes: Hereinafter confidence of difference of two mean values: «*» – $p < .05$, «**» – $p < 0.01$, «***» – $p < 0.001$

At the same time substantially positive changes were registered in the following indicators: length and mass of body, increments of which was accordingly 2.4 and 14.7%, VCL (increment 22%), HBR in rest (8.1%), after dozed physical load (9.4%) and during rest after such load (7.5%) ($p < 0.05$ to 0.001). Besides, positive dynamic was noticed in indices, which reflected functional abilities of muscular system (PI increased by 170.6%), of cardio-vascular system (IR improved by 25.5 %); respiratory system showed trend to improvement – increment of VCL was 6.4% ($p > 0.05$).

Analysis of the same CG indicators also showed some improvement but it was much less, videlicet: length and mass of body (accordingly 2.1 and 9.6%) and PI (increment 124.7%). With it we registered reduction of VI by 10.6% that witnessed about worsening of respiratory system's functional state in provisioning of organism with oxygen in rest.

Applied simultaneously variants of physical education's organization and content facilitated unequal change of girls' physical fitness indicators. For example at EGg we found substantial (from $p < 0.05$ to $p < 0.001$) improvement of all tested indicators; with it the highest increment had muscular strength, which by data of right and left hand dynamometry was, accordingly, 202.4 and 179%, and explosive power, increment of which was 80.7% (see table 1).

In CGg such positive changes were in most of the tested indicators, with exclusion of flexibility (mobility in lumbar spine, shoulder joints), which during the whole year remained on initial level. Concerning improved indicators we obtained the following data: coordination in cyclic motions increased by 4.7%, in throws for distance and acrobatic movements – accordingly by 26.6 and 9.4%, explosive power – by 8.1%, speed power – by 8.6%, muscular strength by results of right and left hand dynamometry – accordingly by 142.4 and 94.8%.

Dynamic of somatic health in tested groups of girls was the following: in EGg quantity of missed because of disease days of academic year in 1st semester was 3.8 ± 0.52 , in 2nd – 2.1 ± 0.47 , i.e. their health showed positive dynamic, but, accordingly low and middle levels (see table 1). Considering total (for two semesters) quantity – 5.9 ± 0.5 days and normative [8], we stated in general low level of girls' health but with trend to improvement to middle level.

In CGg indicator in first semester was at level 3.7 ± 0.58 , in 2nd – 4.8 ± 0.69 , i.e. in total 8.5 ± 1.27 days. The obtained data in all cases witnessed low level of somatic health of this group's girls. At the same time we stated that in this group there was negative trend in indicator's changes, as far as in 1st semester quantity of missed days was much less than in 2nd.

Boys. Comparing morphological functional indicators of EGb at the beginning and at the end of academic year we did not register negative changes of any (see table 2).

Table 2

Dynamic of second form (CEE) boys' indicators of physical condition at stages of formation experiment

Indicator	Group	At beginning		At end		CXhange($\bar{x}_1 - \bar{x}_2$)		t_1 ($\bar{x}_1 - \bar{x}_2$)	t_2 (EG-CG; $\bar{x}_2 - \bar{x}_2$)
		\bar{x}_1	m	\bar{x}_2	m	absolute	%		
<i>Morphological-functional</i>									
Body mass, kg	EG	26.1	0.65	29.1	0.52	3.0	11.5	3.6**	0.2
	CG	26.6	0.76	28.9	0.85	2.4	8.9	2.06*	
Body length, cm	EG	127.2	0.77	132.1	0.72	4.9	3.9	4.65***	0.74
	CG	128.4	0.84	131.3	0.81	2.9	2.3	2.52*	
VCL, ml	EG	1250.1	28.13	1522.0	27.15	271.9	21.8	6.95***	5.33
	CG	1247.5	29.45	1280.0	36.42	32.5	2.6	0.69	
HBR in rest, b.p.m. ⁻¹	EG	85.7	1.1	78.6	0.87	-7.1	8.3	5.06***	3.83
	CG	85.0	1.3	84.0	1.11	-1.0	1.2	0.59	
HBR after physical load,, b.p.m. ⁻¹	EG	121.2	1.85	112.2	1.42	-9.0	7.4	3.86**	3.96
	CG	120.7	2.28	120.7	1.61	0	0	0	
HBR at 45 sec of rest, b.p.m. ⁻¹	EG	87.9	1.27	80.1	0.88	-7.8	8.9	5.05***	4.92
	CG	86.7	1.32	87.3	1.17	0.7	-0.8	0.38	
Power index (PI), %	EG	18.8	1.35	54.0	2.05	35.2	187.2	14.3***	4.21
	CG	16.9	1.54	41.1	2.28	24.2	143.0	8.79***	
Index Ruffiet (IR), conv. Un.	EG	9.5	0.30	7.1	0.25	-2.4	25.3	6.15***	5.38
	CG	9.2	0.38	9.2	0.30	0	0	0	
Vital index (VI) ml.p.kg ⁻¹	EG	47.9	1.45	52.3	1.35	4.4	9.2	2.22*	3.45
	CG	47.4	1.54	45.5	1.44	-1.9	-3.9	0.89	
<i>Physical fitness</i>									
Shuttle run 4x9 m, sec	EG	13.1	0.1	12.0	0.09	-1.1	8.4	8.18***	3.43
	CG	13.1	0.12	12.6	0.15	-0.4	3.4	2.37*	
Throw for distance with main arm, m	EG	9.8	0.42	15.7	0.31	5.9	60.2	11.3***	5.31
	CG	10.8	0.51	12.8	0.45	2.0	19.0	3.04**	
Three forward roll overs, sec.	EG	5.3	0.16	4.1	0.10	-1.2	22.6	6.36***	2.91
	CG	5.3	0.18	4.7	0.18	-0.5	10.4	2.21*	
Long jump from the spot, cm	EG	115.1	1.84	129.1	1.12	14.0	12.2	6.5***	3.44
	CG	116.0	2.00	121.3	1.97	5.3	4.6	1.9	
Forward bent in sitting position, cm	EG	2.7	0.81	6.4	0.62	3.7	137.0	3.63**	2.88
	CG	2.6	0.86	3.2	0.92	0.6	25.4	0.52	
Twisting of rule behind back, cm	EG	65.5	1.42	51.4	1.2	-14.1	21.5	7.58***	7.89
	CG	66.4	1.56	66.0	1.41	-0.4	0.6	0.18	
20 meters straight off run, sec.	EG	4.6	0.09	3.9	0.07	-0.7	15.2	6.14***	3.02
	CG	4.5	0.12	4.4	0.15	-0.1	1.9	0.44	
Hand dynamometry of main arm, kg	EG	4.9	0.4	15.7	0.32	10.8	220.4	21.1***	5.0
	CG	4.7	0.42	11.9	0.69	7.2	155.2	8.97***	
Hand dynamometry of weaker arm, kg	EG	5.1	0.38	14.9	0.36	9.8	192.2	18.7***	5.91
	CG	5.5	0.46	10.3	0.69	4.8	85.7	5.72***	
<i>Somatic health</i>									
1 st semester, days	EG	5.8	0.72	-	-	-	-	-	0.28
	CG	6.1	0.79	-	-	-	-	-	
2 nd semester, days	EG	-	-	4.1	0.64	-	-	-	3.76*
	CG	-	-	8.6	1.01	-	-	-	
Total:	EG	-	-	9.9	0.68	-1.7	29.3	1.77	2.67*
	CG	-	-	14.7	1.8	2.5	-41.0	1.95	

At the same time we determined significant (from $p < 0.05$ to $p < 0.001$) improvement of length and mass of body – increment was accordingly 3.9 and 11.5%. The same change was also in such functional indicators: VCL increased by 21.8%, HBR in rest, after dozed physical load, in rest after load, on the contrary, reduced accordingly by

8.3, 7.4 and 8.9%, but such change witnessed about improvement of indicators. Besides, positive dynamic was registered in indices, reflecting functional abilities of tested organism's systems, as far as PI, IR, VI increased accordingly by 187.2, 25.3 and 9.2%.

In *CGb* we received quite different results – substantial improvement was noticed in much less quantity of indicators in comparison with *EGb*, videlicet: length and mass of body (increment was accordingly 2.3 and 8.9%; $p < 0.05$) and CI (143%; $p < 0.001$). With it we determined trend to worsening of VI (reduction by 3.9%) and HBR in rest, after dozed physical load and (increasing by 0.8%, $p > 0.05$), that witnessed about unfavorable picture in change of functional abilities of respiratory and cardio-vascular systems.

The applied in experiment variants of organization and content of physical education resulted in unequal changes in boys physical fitness's indicators. For example in *EGb* changes implied significant (from $p < 0.05$ to $p < 0.001$) improvement of all tested indicators (see table 2). With it the highest increment was in coordination in throws for distance (60.2%), mobility in lumbar spine (1.7%) and muscular strength – by data of right and left hand dynamometry increment was 220.4 and 192.2%. Improvement of other indicators also was confident but increment was a little less – it was within limits from 8.4 to 22.6%.

In *CGb* coordination in cyclic motions significantly improved (increment 3.4%; $p < 0.05$), in throws for distance (19%; $p < 0.01$), in acrobatic movements (10.4%; $p < 0.05$) and muscular strength by data of right and left hand dynamometry, which increased accordingly by 155.2 and 85.7% ($p < 0.01$). Other indicators in this group had only trend to positive changes that witnessed that their values remained at initial level during academic year.

Dynamic of somatic health in *EGb* had the following specificity: quantity of missed because of disease days in 1st semester was 5.8 ± 0.72 , in 2nd – 4.1 ± 0.64 , i.e. there was certain improvement of indicator (see table 2). Considering total missed because of disease days (9.9 ± 0.68) and existing normative [8], we stated generally low level of health in *CGb* but with trend to improvement.

In *CGb* this indicator in 1st semester was 6.1 ± 0.79 days, in 2nd – already 8.6 ± 1.01 , i.e., in total for academic year – 14.7 ± 1.8 . In all cases, obtained data witnessed low level of CG boys' somatic health, with it with negative trend of changes during academic year.

Conclusions:

1. At present stage most of second form pupils have unsatisfactory psycho-physical level; approaches to organization and realization of physical education's content in CEE for its correction do not consider specificities of daily mental workability during week in different periods of academic year that do not facilitate children's rational adaptation to new regime of studying and rest at CEE and, consequently, improvement of psycho-physical state. In this connection there appears a demand in solution of this problem.

2. The worked out as per offered algorithms program for correction of psycho-physical state of second form pupils in the process of physical education ensures substantial improvement of more indicators than traditional organization and content of physical culture at CEE that witnesses higher effectiveness of our program in solution of the set task.

The prospects of further researches are connected with working out of technologies of psycho-physical state correction for pupils of other primary school forms, considering dynamic of their daily mental workability during week in different periods of academic year.

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