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PECULIARITIES OF PRENOSOLOGICAL CHANGES IN MENTAL AND PHYSICAL HEALTH OF STUDENTS FROM GENERATION Z

A.G. Setko, E.V. Bulycheva, N.P. Setko

The Orenburg State Medical University, 6 Sovetskaya Str., Orenburg, 460000, Russian Federation

Rapid digital technologies development, easily available Internet networks, and electronic gadgets being widely spread and extremely popular have resulted in creation of a new “digital environment”; this environment, within the theory of generations, has become a key factor in forming a new generation, so called Generation Z. At present children pursue a lifestyle that differs significantly from those of previous generations and is characterized with low physical activity, short amount of time spent outdoors, and great educational loads. All this, together with impacts exerted by new hygienic factors, for example, information and communication technologies being actively and profoundly used by modern children, causes risks for mental and physical health. We assessed mental and physical health of 80 children belonging to Generation Z (so called “indigo children”). They were all born in 2008 and were 10 years old at the moment of the examination that took place on April 05, 2018. We revealed that Generation Z children had certain psychological and personal traits. Here we should mention 3.5 times greater number of children with social-psychological deadadaptation in the communicative and behavioral sphere; 2.4 times greater number of children with greater anxiety and 2.5 times lower sociometric status against the previous generation. We detected a decrease in physiometric parameters of physical development such as 14.7 % lower vital capacity of lungs and 22.3 % lower response hand grip strength; these negative trends were accompanied with overweight being more widely spread among Generation Z against the previous one. Children with normal body weight were 1.3 times less frequently detected among Generation Z, but 2.1 times more children had overweight than among children of the same age who were examined 10 years ago.

Key words: digital environment, Generation Z, “indigo children”, Generation Y, “millennials”, a psychological profile of a contemporary generation, social and psychological adaptation, anxiety, communicative efficiency, physiometric and somatometric parameters of physical development, body mass index

Actuality. Rapid digital technologies development, easily available Internet networks, and electronic gadgets being widely spread and extremely popular have resulted in creation of a new “digital environment”; this environment, within the theory of generations, has become a key factor in forming a new generation, so called Generation Z [1]. Live activities of children in the digital environment have no analogues in phylogenesis and involve persistent exposure to various physical factors (electromagnetic irradiations and acoustic impacts); physical strain of the nervous and muscular system caused by forced poses children have to assume while working with laptops, phones, and pads; “finger-

writing” on gadget screens; static loads occurring due to necessity to hold a gadget in a position; intellectual and emotional stress [2]. According to foreign scientific data, contemporary children and teenagers have been growing in a hyper-information space and digital environment and, as it is assumed by foreign experts, it results in a peculiar psychological profile of this contemporary generation [3–6]. Meanwhile, there are no sufficient data available in domestic scientific works that could confirm this assumption and it makes our research truly vital. Data on the examined issue which we have managed to obtain from scientific literature indicate it is quite relevant to examine peculiarities related

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Andrei G. Setko – Doctor of Medical Sciences, Professor, Head of the Department for Children’s and Teenagers’ Hygiene with Food and Labor Hygiene (e-mail: a_isetko@mail.ru; tel.: +7 (3532) 50-06-06 (ext. 402); ORCID: <http://orcid.org/0000-0002-9724-8672>).

Ekaterina V. Bulycheva – Candidate of Medical Sciences, Assistant Professor at the Preventive Medicine Department (e-mail: e-sosnina@mail.ru; tel.: +7(3532) 500606 (ext. 642); ORCID: <https://orcid.org/0000-0002-2915-2046>).

Nina P. Setko – Doctor of Medical Sciences, Professor, Head of the Preventive Medicine Department (e-mail: nina.setko@gmail.com; tel.: +7(3532) 50-06-06 (ext. 612); ORCID: <https://orcid.org/0000-0001-6698-2164>).

to health formation at the prenosological stage making comparison between the current generation and the previous one; to reveal psychological peculiarities of a personality, character, and perception of the world contemporary children might have. All this will help to scientifically substantiate efficient ways to raise and educate children from Generation Z.

Our research goal was to describe mental and personal peculiarities of students from Generation Z.

Data and methods. We assessed mental and physical health of 80 children (The 1st group, generation Z or “indigo children”) who were born in 2008 and were 10 years old at the moment our research was performed (April 05, 2018). Mental health was assessed via examining social and psychological adaptation, communicative efficiency, and anxiety during lessons and in everyday life. The reference group was made up of 100 children (the 2^{ns} group, Generation Y or “Millennials”) who had been born in 1998 and who also had been 10 years old at the moment they had been examined (September 09, 2008). We examined social and psychological adaptation via questioning which was performed among school teachers; their answers were processed according to a procedure developed by A.A. Baranov et al (2005) and it allowed determining social and psychological adaptation in educational, communicative, and behavioral spheres [7]. Communicative efficiency of schoolchildren was determined via a sociometric experiment with a sociometric index measuring [8]. A child’s sociometric index is determined via calculating positive and negative choices made about him or her by his or her classmates. Depending on it a status category was calculated for each child; I meant high status; II, average; III, low. We also applied questioning to examine anxiety as per CMAS questionnaire (The Children’s Form of Manifest Anxiety Scale) adapted by A.M. Prikhojan (1994) [9]. Physical health of the examined children was comparatively estimated via comparing physical development parameters such as height, body mass, vital capacity of lungs, response hand

grip strength, as well as body mass index according to nomograms recommended by the WHO (2007).

Obtained data were statistically analyzed with Microsoft-MS Office MS Exiles software package and Statistica 7.0. Critical level of statistical significance was taken to be equal to 0.05. We controlled distribution of qualitative parameters in two examined groups with Kolmogorov – Smirnov test and Shapiro – Wilkes test. Qualitative parameters obtained for two examined groups were compared via calculating Student’s t-test.

Results and discussion. We established that 55 % children in the 1st group and 63 % children in the 2nd group were normally adapted socially and psychologically. Prevalence of social and psychological deadaptation in different forms had some peculiarities among Generation Z children in comparison with the previous Generation Y (Figure 1). Thus, prevalence of social and psychological deadaptation in educational sphere amounted to 18.6 ± 1.2 cases per 100 children in the 1st group against 27.9 ± 1.1 cases per 100 children in the 2nd group and it was 1.5 times lower. It is probably due to Generation Z children being more efficient in terms of working with information, and their neuropsychic development is faster; it allows them to successfully adapt to contemporary educational environment which is full of digital technologies [3, 10]. Children from the 1st group had behavioral deadaptation 3 times more frequently than children from the 2nd group as it amounted to 48.6 ± 2.5 cases per 100 children against 16.2 ± 0.5 cases per 100 children ($p \leq 0.05$) accordingly; deadaptation in communicative sphere was 3.5 times more frequent among them (66.8 ± 1.9 cases per 100 children in the 1st group against 19.1 ± 0.9 cases per 100 children in the 2nd one, $p \leq 0.05$).

Greater social and psychological deadaptation in behavioral sphere detected among children from the 1st group can probably be due to their greater individualization and infantilism which is typical for Generation Z. They are intolerant to others, want their wishes

to be fulfilled at once, but fail to realize that it is impossible in real life and not as simple as it is in the digital environment. All this is consistent with scientific data that contemporary children are being hyper-protected by their parents and it results in them being egoistic and removes any social restrictions in their mentality [11]. Besides, experts note that contemporary children are prone to autism and it is an extreme manifestation of how the mankind is evolving in the digital environment [3].

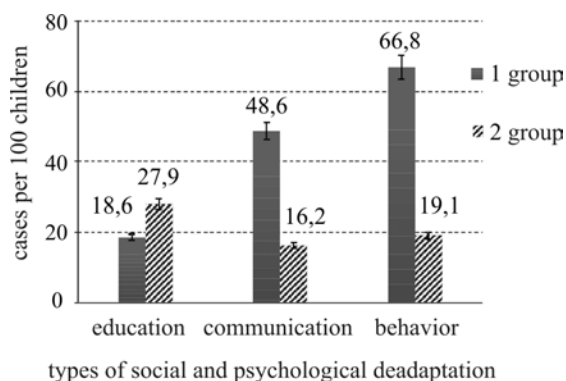


Figure 1. Prevalence of social and psychological deadadaptation in children from the examined groups

A decrease in communicative activity was confirmed by only 3.5 % children in the 1st group having high communicative efficiency whereas there were 10.2 % with such communication skills in the 2nd group. 78.7 % children in the 1st group had low communicative efficiency and it was 2.6 times higher than in the 2nd group (30.3 %; Table 1).

Table 1

Children in the examined group distributed as per their communicative efficiency (%)

Communicative efficiency	Children groups	
	The 1 st one	The 2 nd one
Average	17.8	59.5
High	3.5	10.2
Low	78.7	30.3

It should be noted that average sociometric index was 2.5 times lower among children from the 1st group with high communicative efficiency against the children from the 2nd group with the same parameters; 1.5 times

lower among children with average communicative efficiency; and 1.4 times lower among children with low communicative efficiency (Figure 2). Average sociometric index among children from the 1st group with low communicative efficiency was negative and it meant that those children were predominantly excluded from communication and didn't have any sympathies from their classmates. Negative sociometric index combined with 78.7 % children in the 1st group having low communicative efficiency can indicate that examined Generation Z children are mostly introverts.

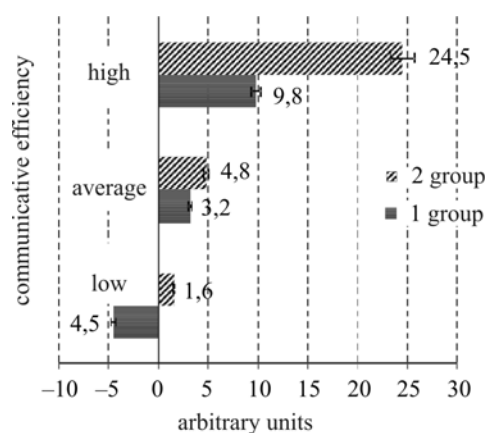


Figure 2. Sociometric index among children depending on their communicative efficiency

There was a research work published by the American Psychological Association; its authors determined that Generation Z representatives had higher neuropsychic strain and emotional sufferings in their personality profiles than people from previous generations [11]. It is also confirmed by our research. Thus, it was shown that average scores given to anxiety among children from the 1st group amounted to 25.8 ± 0.56 against 15.6 ± 0.33 among children from the 2nd group ($p < 0.05$). We established that only 10.3 % children from the 1st group had normal anxiety level whereas it was 40.3 % in the 2nd group. And extremely high anxiety was detected in 30.6 % children from the 1st group and only in 12.2 % children from the 2nd group (2.5 times lower). Apparently increased anxiety was detected 1.6 times more frequently among children from the 1st group against the 2nd one, 37.8 % and 23.6 % children accordingly (Figure 3).

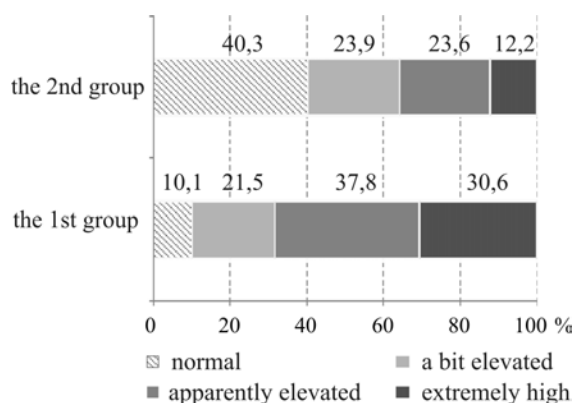


Figure 3. Children from the examined groups distributed depending on anxiety level

We detected an authentic increase in scores given to anxiety in each subgroup of children (subgroups were singled out depending on anxiety level) from the 1st group against those from the 2nd one (Table 2). Thus, average scores given to anxiety in children’s subgroup with a bit elevated anxiety amounted to 20.3 ± 0.01 among the children from the 1st group against 19.8 ± 0.03 among the children from the 2nd one ($p < 0.05$); scores given to anxiety among children with apparently elevated anxiety amounted to 25.8 ± 0.02 in the 1st group and 24.5 ± 0.02 in the 2nd one ($p < 0.05$); average scores given to anxiety among children with extremely high anxiety amounted to 31.6 ± 0.09 in the 1st group against 28.3 ± 0.04 in the 2nd one.

Recent research has revealed that lifestyle pursued by contemporary children has changed drastically in comparison with previous generations [12]. Reduced physical activity and shorter periods of time spent outdoors make for a decrease in parameters that describe physical development [13, 14]; this phenomenon is predominantly caused by impacts exerted by new hygienic factors such as information and communication technologies [15, 16], and high educational loads as well [17–20]. Walking to school and back, some household chores, and physical training at school are often only physical activities for a considerable number of contemporary children [21, 22]. Additional physical training with a high dynamic component (sport clubs or dancing classes, for

example) could somehow satisfy a biological need in natural locomotion; however, only each third contemporary child attends such clubs or classes [23].

Table 2

Scores given to anxiety among children from the examined groups

Children’s subgroups singled out depending on anxiety level:	Examined groups	
	The 1 st group	The 2 nd group
Normal anxiety	17.5 ± 0.02	$16.1 \pm 0.01^*$
A bit elevated anxiety	20.3 ± 0.01	$19.8 \pm 0.03^*$
Apparently elevated anxiety	25.8 ± 0.02	$24.5 \pm 0.02^*$
Extremely high anxiety	31.6 ± 0.09	$28.3 \pm 0.04^*$

Note: * – $p < 0.05$ when the examined groups are compared.

We detected that only height didn’t differ in two groups out of all the parameters that describe physical development; on average it was 123.8 ± 0.86 cm in the 1st group and 124.3 ± 0.8 cm in the 2nd one ($p > 0.05$) (Table 3). Body mass was by 13.6 % authentically higher among children from the 1st group and amounted to 25.1 ± 0.83 kg against 22.1 ± 0.61 kg in the 2nd one ($p < 0.05$). At the same time, physiometric parameters of physical development were lower among children from the 1st group in comparison with their counterparts from the 2nd one; thus, average vital capacity of lungs was by 14.7 % lower, and response hand grip strength, accordingly, was by 22.3 % lower. Most experts have recently pointed out that this decrease in physical abilities of a body is caused by contemporary children having no interest in doing active sports, their low physical activity, wide use of gadgets in everyday life, and improper nutrition [24–26].

All the above mentioned facts allowed us to distribute the examined children into subgroups depending on vital capacity of their lungs and response hand grip strength (Figure 4). Thus, there were 1.6 times more children with reduced vital capacity of lungs in the 1st group than in the 2nd one; with reduced response hand grip strength, 1.3 times more.

Table 3
Physical development of children
from the examined groups

Parameters	Examined groups	
	The 1 st group	The 2 nd group
Height, cm	123.8 ± 0.86	124.3 ± 0.8
Body mass, kg	25.1 ± 0.83	22.1 ± 0.61*
Vital capacity of lungs, l	0.95 ± 0.4	1.09 ± 0.3*
Response hand grip strength	6.47 ± 0.45	8.49 ± 0.88*
Body mass index	26.3 ± 1.55	21.5 ± 1.14*

Note: * – $p < 0.05$ when the examined groups are compared.

Besides, only 63.1 % children from the 1st group had normal body mass; 30.8 % had overweight, and 6.1 % had body mass deficiency; whereas 82.8 % children from the 2nd group had normal body mass, only 14.7 % had overweight, and 2.5 % had body mass deficiency.

Conclusion. We revealed that Generation Z children had mental and personal peculiarities which became apparent through

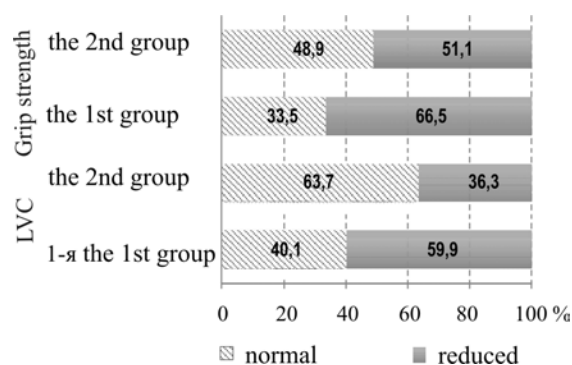


Figure 4. Children from the examined groups distributed depending on vital capacity of their lungs (LVC) and response hand grip strength

a greater number of children with socio-psychological deadaptation in communicative and behavioral environment, with high anxiety and lower sociometric status; there were also more children with a decrease in phylometric parameters of physical development together with a trend for having overweight against the previous generation.

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