Section 2
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AUTONOMIC DYSFUNCTION IN PRESCHOOL CHILDREN

High prevalence of autonomic dysfunction syndrome in schoolchildren was found, the specifics of its clinical presentation with identification of the most salient symptoms are given. The purpose of the work was to find the occurrence of NS (nervous system) functional disorders in various age groups, with gender differences noted, among schoolchildren of secondary schools in Almaty. The NS dysfunction was assessed using questionnaires in 1827 schoolchildren (966 girls –52.87%, 861 boys –47.12%) 7–17 years old, attending the secondary schools in Almaty. As a result, we found numerous NS functional disorders among 56,8% of adolescents. Manifestations of vegetative instability were expressed as headaches in 44.5% of children, drowsiness in 53.8% of cases, complaints of fatigue and weakness in 56.8% of children. Complaints of sleep disturbance were recorded in 32% of schoolchil-dren, a greater number of complaints of syncope were received in the tenth grade from girls - 22%. Cardialgia, as a manifestation of NDC and adaptive-adaptive mechanisms of the body, occurred in 20.4% of cases.

Key words: autonomic dysfunction, nervous system, schoolchildren, forms (grades).

Introduction

Though demographic indicators have somewhat evened out recently, deterioration of health of children and adolescents attending educational institutions has become apparent [1,2]. It is reported elsewhere [3,4] that only 14-23% of schoolchildren are practically healthy, another 50% have functional disorders, and the rest have chronic diseases. Health survey data are indicative of significant deterioration of the health status of children and adolescents during the period of schooling. By the time they finish school, one in three graduates has myopia and impaired posture; one in four has cardiovascular pathology [5]. The leading cause for that, according to authors, is low physical activity and high educational burden [6,7].

The Kazakhstan Ministry of Health data [8] evidence that 53.8% of Kazakh schoolchildren have various health problems. Health check data suggest that every seventh schoolboy has digestive and musculoskeletal system diseases, every ninth would suffer from nervous system diseases, and every tenth, from diseases of respiratory tract and endocrine system.

The questionnaire findings show high prevalence of risk factors for the development of 'school-derived' diseases: lack of sleep, low physical activity, shortened walking time, visual overload, unhealthy dietary patterns, dull forms of leisure.

During the schooling period, the number of children with the musculoskeletal system disorders increases 1.5-2 times, with nervous disorders - 2 times, with allergic diseases - 3 times, with myopia - 5 times [9,10].

Therewithal, the published studies [10,11] provide scarce data on dynamic detection of the most

significant "school" pathology at various stages (grades) of education. Moreover, the bulk of studies on this topic primarily have focused on new type schools (lyceums, gymnasiums, private schools) rather than general education schools.

All the above imparts particular importance to the study and assessment of the health of pupils attending the general education schools in their relation to educational environment and lifestyle factors.

Objective of the study:

To assess the health status of students of secondary schools in Almaty, using the questionnaire survey method.

Material and Methods

To achieve the above goal, we developed a screening questionnaire detecting the nervous system pathology. A descriptive epidemiological study was carried out to study the prevalence of these diseases in children. We interviewed on-site (at the place of study) 1824 schoolchildren of 1st through 11th grades, 6 to 17 years old, in general education schools of Almaty. Pupils in grades 1-4 were surveyed through questions asked from their parents, while in grades 5-11 the questionnaires were filled out by the students themselves. Pupils were taught according to standard curricula, with teachers imposing almost similar requirements on them. After being duly instructed on completing the questionnaire, both children and their parents checked the respective "yes" or "no" boxes.

The questionnaire data were fed in a database using the MS Access and MS Excel software, with the primary somatometric parameters values established. The average value of the (M) indicator, its error (m), and the mean squared deviation (δ) were calculated. The databases were statistically processed using the SPSS software. The correlation coefficient was calculated using the Eviews 8.0 statistical package. We also performed a hypothesis testing based on sample fraction (relative value) data. We observed methodical flawlessness and thoroughness in material collection and processing, used unified methods to ensure comparability of the results.

Results and Discussion

Our questionnaire-based research of junior and senior grade schoolchildren in Almaty showed prevalence of autonomic dysfunction syndrome in children, clinical presentation specifics were described and the most significant symptoms identified.

An average of 44.5% of all interviewed schoolchildren complained of headache: 52.9% of girls and 47.2% of boys. Figures 1 and 2 show the number of headache complaints in girls vs. boys start differing dramatically from the sixth grade ($p \leq .0.01$) ($p \leq .0.05$). In grades 7 and 8, the difference in complaints by sex is as high as 20%, while in grades 9 it is 25%.

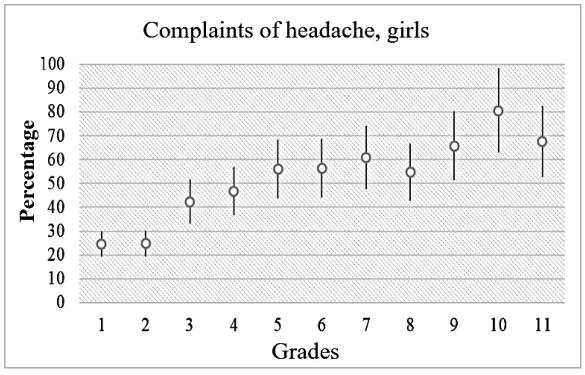


Figure 1 – Confidence intervals in girls complaining of headache, by grades, %

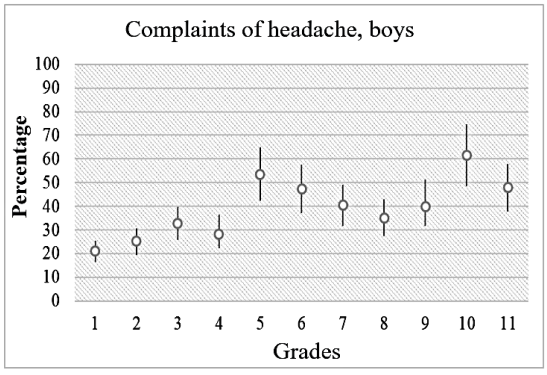


Figure 2. Confidence intervals in boys complaining of headache, by grades, %

Complaints of drowsiness were recorded in 53.8% of cases. Similar to headache complaints, girls are more likely to complain of drowsiness than boys (Figures 3,4). Starting from the fourth grade, the results reported for drowsiness are significant at one per cent ($p \leq .0.01$) and five per cent ($p \leq .0.05$) level. In the ninth grade, the difference in complaints by sex is as high as 37.5%. We can conclude that in the ninth to tenth grades, due to the increasing load of fundamental subjects, uptake of information by girls

becomes longer than by boys. Figures 3 and 4 show that from the first to the eleventh grades, drowsiness complaints would increase 2.2 times for girls and 2.0 times for boys. We also calculated correlation coefficients for autonomic dysfunction symptoms for girls girls and boys (see Tables 1 and 2).

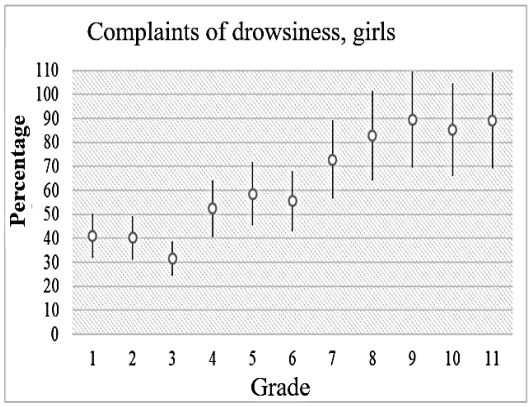


Figure 3 – Confidence intervals in girls complaining of drowsiness, by grades, %

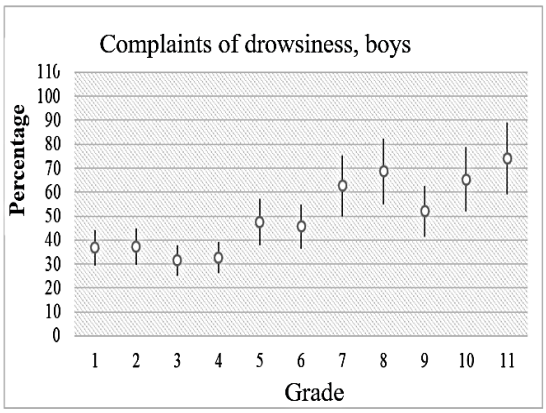


Figure 4 – Confidence intervals in boys complaining of drowsiness, by grades, %

"Drowsiness" and "Headaches" have demonstrated close correlation (0.84) at the one percent significance level, i.e. the two symptoms are closely correlated with each other. The correlation coefficient between the variables "Drowsiness" and "Weakness" in girls equaled 0.92, this value is significant at one percent level ($p \leq .0.01$). Table 1 shows very close correlation.

Table 1 – Values of correlation coefficients by symptoms of autonomic dysfunction in girls

Covariance analysis					
Correlation coefficient					
t-statistics					
Probability	Headaches	Weakness	Drowsiness	Sleep disturbance	Sweatiness
Headaches	1.000000				

Weakness	**0.887004**	1.000000			
	5.762747	-----			
	0.0003	-----			
Drowsiness	**0.837122**	**0.923608**	1.000000		
	4.591020	*7.228117*	-----		
	0.0013	*0.0000*	-----		
Sleep disturbance	**0.939186**	**0.927571**	**0.959549**	1.000000	
	8.204640	*7.447467*	*10.22464*	-----	
	0.0000	*0.0000*	*0.0000*	-----	
Sweatiness	**0.635733**	**0.785574**	**0.898679**	**0.838907**	1.000000
	2.470756	*3.808737*	*6.146823*	*4.623988*	-----
	0.0355	*0.0042*	*0.0002*	*0.0012*	-----

Table 2 – Values of correlation coefficients by symptoms of autonomic dysfunction in boys

Covariance analysis					
Correlation coefficient					
t-statistics					
Probability	Headaches	Weakness	Drowsiness	Sleep disturbance	Sweatiness
Headaches	1.000000				

Weakness	**0.693087**	1.000000			
	2.884439	-----			
	0.0180	-----			
Drowsiness	**0.602005**	**0.774417**	1.000000		
	2.261780	*3.672102*	-----		
	0.0500	*0.0051*	-----		
Sleep disturbance	0.387117	**0.671753**	**0.734579**	1.000000	
	1.259558	*2.720475*	*3.247840*	-----	
	0.2395	*0.0236*	*0.0100*	-----	
Sweatiness	0.044357	0.507542	0.340585	0.668301	1.000000
	0.133202	*1.767150*	*1.086727*	*2.695159*	-----
	0.8970	*0.1110*	*0.3054*	*0.0246*	-----

Complaints of fatigue and weakness were found in 56.8% of children. Figure 5 clearly shows an increase in complaints of weakness among girls, with no similar increase in complaints from boys and, on the contrary, a fluctuation in the number of complaints in one range (30-60%) can be seen. In tenth grade compared to the first grade, the school-girls' complaints rate increased by 2.3 times, while boys demonstrated only a 1.3 times increase over the same period of time. The variation in the number of complaints among boys did not significantly differ over the 1st to 11th grade span, as can be clearly seen in Figure 6. In girls, the number of complaints of weakness has predictably doubled by the eleventh grade, while the maximum value of 2.26 times hit in the tenth grade.

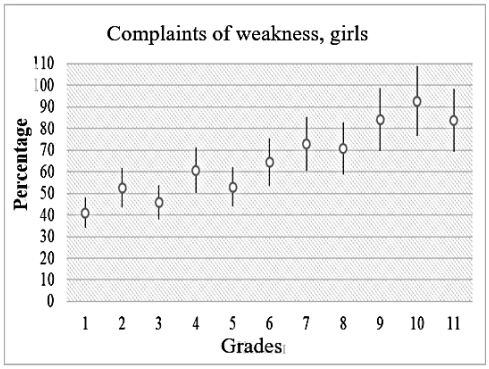


Figure 5 – Confidence intervals in girls complaining of weakness, by grades, %

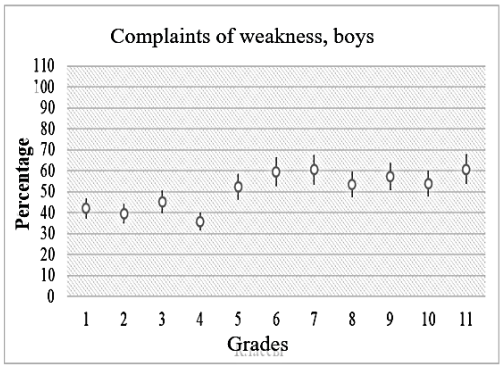


Figure 6 – Confidence intervals in boys complaining of weakness, by grades, %

In a multitude of neurological symptoms, complaints of sleep disturbance were the most common, reported in 32% of schoolchildren. From the first grade onward, both boys and girls demonstrate an increase in the number of complaints by 3.3 and 4.5 times, respectively (see Table 3). It's obvious that "Sleep disturbance" and "Sleepiness" shall correlate very closely as evidenced by calculations in Tables 1 and 2. While the number of complaints of sleep disturbance among girls has been steadily increasing from grade to grade, in the eleventh grade this increase, as percentage of complaints among boys, climbed 2.6 times compared to the tenth grade, although no sharp fluctuations had been observed before that. Most likely, this is due to the forthcoming Unified National Testing (UNT), with no additional calculations in support of this argument needed.

The "Sleep disturbance" variable also correlates with all other neurological symptoms (see Table 2). For the first time, the number of complaints of the symptom in question from boys has exceeded, although not much, the figures for girls in the eleventh grade: 60.9% vs. 59.5% of girls. One asterisk corresponds to a 10% value (p>0.10).

Table 3 – Testing hypotheses about equality of percentage of sleep disturbance complaints for boys and girls by grade,%

Grades	Girls (N=966) av.value (CI)	Boys (N=861) av.value (CI)	Boys / Girls
1st Grade	13.1 (9.2–17.1)	18.4 (13.2–23.7)	*t = –0.84, p≤.100*
2nd Grade	13.4** (9.4–17.5)	23.1** (16.5–29.7)	*t = –1.72, p≤.021*
3rd Grade	20.7 (14.5–27.0)	20.0 (14.3–25.7)	*t = 0.13, p≤.224*
4th Grade	31.1*** (21.7–40.6)	17.4*** (12.4–22.4)	*t = 2.29, p≤.006*
5th Grade	36.6* (25.5–47.6)	28.6* (20.4–36.7)	*t = 1.20, p≤.058*
6th Grade	37.9 (26.5–49.4)	34.2 (24.4–44.0)	*t = 0.59, p≤.139*
7th Grade	48.9*** (34.1–63.7)	27.3*** (19.5–35.1)	*t = 3.08, p≤.001*
8th Grade	52.4** (36.6–68.3)	38.4** (27.4–49.3)	*t = 1.83, p≤.017*
9th Grade	53.9*** (37.7–70.2)	29.3*** (21.0–37.7)	*t = 3.07, p≤.001*
10th Grade	58.5*** (40.9–76.2)	23.1*** (16.5–29.7)	*t = 2.84, p≤.001*
11th Grade	59.5 (41.5–77.4)	60.9(43.5–78.2)	*t = –0.11, p≤.228*

Note: *,**,*** - significant at 0.1; 0.05;0.01

The number of complaints of sweating as percentage of total pupils is the lowest (15.6%) compared to the other symptoms examined (see Table 4).

Table 4 – Testing hypotheses of equal percentage of sweat complaints for boys and girls by grade,%

Grades	Girls (N=966) av.value (CI)	Boys (N=861) av.value (CI)	Boys / Girls
1st Grade	13,1 (9,7–16,6)	15,8 (12,1–19,4)	*t = –0.44, p≤.165*
2nd Grade	9,3 (6,8–11,7)	7,7 (5,9–9,5)	*t = 0.39, p≤.174*
3rd Grade	9,0** (6,6–11,4)	15,8** (12,1–19,4)	*t = –1.49, p≤.034*
4th Grade	18,9*** (13,9–23,8)	8,7*** (6,7–10,7)	*t = 2.09, p≤.009*
5th Grade	11,4* (8,4–14,4)	14,3* (11,0–17,6)	*t = –0.62, p≤.058*

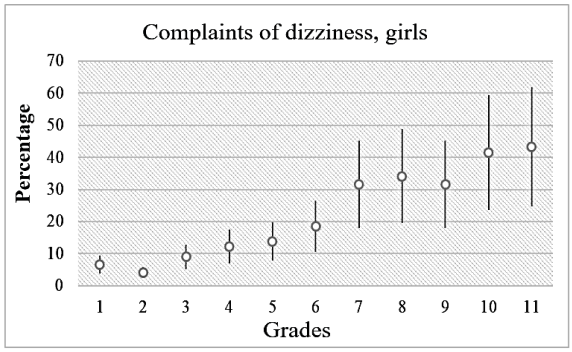
6th Grade	16,1 (11,9–20,4)	15,8 (12,1–19,4)	*t = 0.59, p≤.139*
7th Grade	20,7*** (15,2–26,1)	11,1*** (8,5–13,7)	*t = 3.08, p≤.001*
8th Grade	28,0** (20,6–35,5)	18,6** (14,3–22,9)	*t = 1.83, p≤.017*
9th Grade	27,6*** (20,3–34,9)	20,0*** (15,4–24,6)	*t = 3.07, p≤.001*
10th Grade	19,5*** (14,4–24,7)	7,7*** (5,9–9,5)	*t = 2.84, p≤.001*
11th Grade	27,0 (19,9–34,2)	21,7(16,7–26,8)	*t = –0.11, p≤.228*

*Note: *,**,*** - significant at 0.1; 0.05;0.01*

This is also corroborated by the calculations presented in Table 2. Sweatiness correlates slightly weaker with the rest of the variables. We expected boys to complain of sweating more often as they are more active physically, but this did not come true, and girls, again, complained more often, which, among other things, may stem from change in the hormonal background in high school.

Differences in sweating complaint rates between male and female students were verified for grades 3 and 8 at a 5% significance level, that is, with a 95% probability, for grades 4, 7, 9 and 10 with a 99% probability, and for grades 5 with a 90% probability. No statistically significant differences were found for the remaining grades (first, second and eleventh grades).

We reviewed another questionnaire survey data, such as dizziness or orthostatic intolerance experienced by schoolchildren when changing their body position, and found these complaints to build up steadily among schoolchildren from the 4th to 11th grades: from 10.3% to a maximum of 41.7% in the 11th grade. In general, this symptom was observed in 16.4% of students, which is quite a large number. These symptoms were more often registerred in girls. In most cases, the above symptoms probably come as a result of incipient puberty (11 to 12 years of age in girls and 13 to 14 years of age in boys and an increased study load of middle and high school students, especially in the 10th (31.3%) and 11th (41.7%) grade in anticipation of the forthcoming unified national test: both boys and girls are experiencing enormous mental and physical stress, as seen in Figures 7 and 8 for the eleventh grade. The confidence interval in Figures 1 and 2 shows us quantitative range in which dizziness complaints will be detected. Starting from the seventh grade, the percentage of complaints among girls is increasing, while among boys it is, conversely, decreasing to reach almost a convergence point in the eleventh grade; this corroborates our hypothesis that the number of complaints is equal for both sexes.



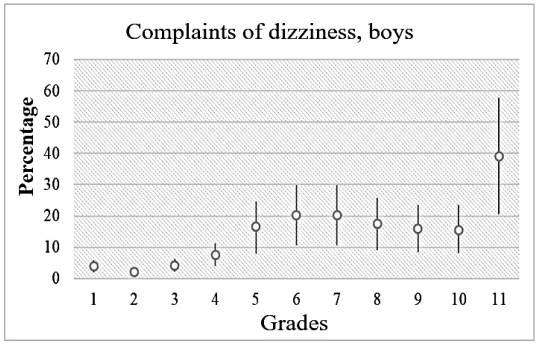


Figure 7 – Confidence intervals of number of dizziness in girls, by grades, %

Figure 8 – Confidence intervals of number of dizziness in boys, by grades, %

Thus, the results we obtained from the questionnaire data on autonomic stability in the interviewed students of general education schools are consistent with the published data [12,13]. These results reflect the degree of mastery of general education subjects. Newcomers to school, who have

to study for at least 3-4 hours with short breaks, will find the first two years of study the most difficult in terms of getting used to this pace of life. So, it is natural to see the number of vertigoes in this group above the average for grade one to four schoolchildren. The results obtained for the fifth grades also seem natural, as additional general subjects are being introduced at this point of schooling, with a separate teacher for each subject, which may also add stress in the beginning. This situation will be resolved by Grade 6, when pupils get used to the way each teacher teaches and the amount of homework. The ninth and tenth grades are known to introduce more hours of workload in core curriculum (mathematics, physics, chemistry, geography, etc.) in view of impending single national test, which may also have a negative impact on well-being. The results of the eleventh grade are in agreement with the logic of research. In this case, the main hypothesis was that, on average, no more than 27 pupils would experience dizziness due to the stressful study load, and given the number of children surveyed in the 11th grade, this number would be nearly half (27/60=0.45) of total pupils count, i.e. 45% of the surveyed cohort complained of dizziness.

Fainting is a sudden short-term loss of consciousness, which may be preceded by a prodromal signs and symptoms: a sense of discomfort, nausea, yawning, diaphoresis, leg muscle weakness, darkened vision, flickering "flies" before the eyes, surging dizziness, buzzing or tinnitus in the ears, numbness of the extremities. Autonomic dysfunction is a frequent cause of fainting in schoolchildren [14].

Frank manifestation of vascular dysfunction, such as fainting, was fortunately less common: 4.6% of cases in both schools. In these two schools, girls had fainting in 5.6% and boys in 3.5% of cases.

Table 9 shows the hypothesis of fainting equality between boys and girls by grade, as percentage.

Table 5 – Testing hypotheses of equal percentage of fainting in boys and girls by grade, %

	Girls (N=966) av.value (CI)	Boys (N=861) av.value (CI)	Boys / Girls
1st Grade	3.3 (1.4–5.2)	3.9 (2.4–5.5)	t = –1.69, p<.001
2nd Grade	1.0 (0.4–1.6)	3.3 (2.0–4.6)	t = –10.23, p<.000
3rd Grade	4.5 (1.9–7.1)	0.0 (0.0–0.0)	t = 21.80, p<.000
4th Grade	4.9 (2.0–7.8)	2.2 (1.3–3.0)	t = 10.92, p<.000
5th Grade	2.4 (1.0–3.9)	4.8 (2.9–6.6)	t = –8.80, p<.000
6th Grade	6.5 (2.7–10.2)	4.4 (2.6–6.1)	t = 7.46, p<.000
7th Grade	6.5 (2.7–10.3)	5.1 (3.0–7.1)	t = 4.13, p<.001
8th Grade	2.4 (1.0–3.9)	4.7 (2.8–6.5)	t = –6.98, p<.000
9th Grade	10.5 (4.4–16.7)	1.3 (0.8–1.9)	t = 20.16, p<.001
10th Grade	22 (9.1–34.8)	3.8 (2.3–5.4)	t = 11.66, p<.004
11th Grade	10.8 (4.5–17.1)	8.7 (5.3–12.1)	t = 1.40, p<.003

Table 2 data precludes us from rejecting the null hypothesis that the number of fainting complaints among boys and girls in the first and eleventh grades are equal, which is also clearly illustrated in Figures 3 and 4. For all other grades, this hypothesis is rejected at 5 percent significance. Herewith, the processed computed values of the questionnaires for girls and boys yielded the opposite result for the second to tenth grades: in the second grade, boys complained of fainting more often than girls, while in the third girls fainted more often, in the fourth grade, again boys, and so on. The highest number of complaints was reported in the tenth grade girls: 22 per cent, which figure really stands out compared with other grades, where percentage of fainting was in the range of one to eleven per cent.

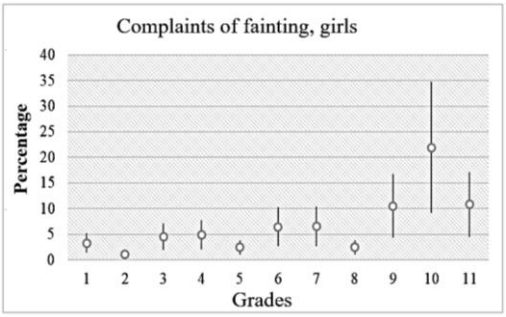


Figure 9 – Confidence intervals of number of fainting in girls, by grades, %

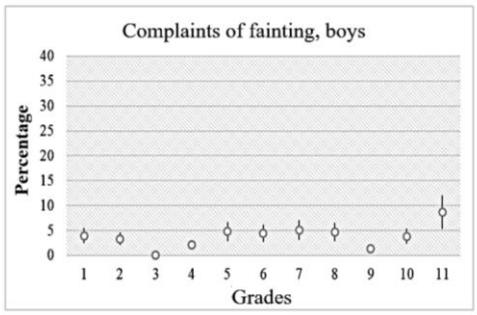


Figure 10 – Confidence intervals of number of fainting in boys, by grades, %

The results are also consistent with the logic of research. It is clear that the number of dizziness is observed more often in any age category in contrast to fainting, as supported by the z-statistics values. The main hypothesis for the first to fourth grades is that the average number of fainting will not exceed six cases, for fifth to eighth grades it will not exceed 9 cases, and for ninth to eleventh grades the number of fainting will not exceed 8 cases. Thus, we can state with 95 per cent probability that in similar secondary schools, i.e. schools with approximately the same study load, the number of fainting due to the stressful learning process will not exceed 6-9 cases per year on average.

The cardiovascular system is the one that reacts most promptly to changes in the body-environment balance and gets actively involved in all adaptive responses [15]. The cardiovascular system is regarded as a universal indicator of all pathological processes, that reflects the level of regulatory mechanisms and adaptive capacity of the body [14,15].

Neurocirculatory dystonia (NCD) is a functional disorder of the cardiovascular system in children most commonly seen in adolescence at puberty, when the body is subjected to alteration and all regulatory processes, including the function of the cardiovascular system, undergo significant changes. There are also gender differences: in girls, the NCD is registered much more often [12]. Psycho-emotional stresses, which often accompany the puberty period, also play an important role [13].

Cardialgia (pain in or near the heart) occurred in 20.4% of interviewees, equally as often in boys and girls, also were reported in school No.15 (17.7%), and more often in school No.16 (20.3%).

Table 10 tests the hypothesis that the average number of complaints of heart pain among schoolchildren will not exceed 19 for primary schoolchildren, 51 complaints for schoolchildren in grades 5 to 8, and 32 complaints for high schoolchildren.

Table 6 – Testing the hypothesis that percentage of complaints of heart pain in boys and girls by grade are equal, %

	Girls (N=966) av.value (CI)	*Boys (N=861) av.value (CI)*	*Boys / Girls*
1st Grade	8.2 (4.6–11.8)	0.0 (0.0–0.0)	*t = 19.50, p<.001*
2nd Grade	9.3 (5.2–13.4)	8.8 (5.6–12.0)	*t = 1.08, p<.001*
3rd Grade	9.9 (5.5–14.3)	14.7 (9.3–20.2)	*t = –9.99, p<.001*
4th Grade	16.4 (9.1–23.7)	7.6 (4.8–10.4)	*t = 19.01, p<.001*
5th Grade	17.1 (9.5–24.7)	28.6 (18.0–39.1)	*t = –17.32, p<.002*
6th Grade	15.3 (8.5–22.1)	21.1 (13.3–28.8)	*t = –11.30, p<.002*
7th Grade	42.4 (23.6–61.2)	24.2 (15.3–33.2)	*t = 21.26, p<.003*
8th Grade	37.8 (21.0–54.6)	23.3 (14.7–31.8)	*t = 15.66, p<.004*

9th Grade	31.6 (17.6–45.6)	20 (12.6–27.4)	*t = 12.19, p<.003*
10th Grade	51.2 (28.5–74.0)	34.6 (21.9–47.4)	*t = 5.89, p<.013*
11th Grade	56.8 (31.6–81.9)	30.4 (19.2–41.6)	*t = 8.28, p<.015*

With regard to the equality of complaints of heart pain, we can accept the null hypothesis for the second grade, that is, there is no significant difference in the number of complaints from girls and boys. In the other cases, the null hypothesis is rejected, as we clearly see in Figures 11 and 12. As in all previous cases, the number of complaints received from girls is almost twice as high as the number of complaints of heart pain from boys.

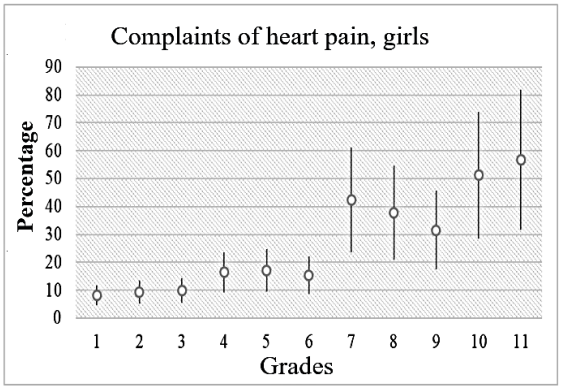


Figure 11 – Confidence intervals of number of heart pain in girls, by grades, %

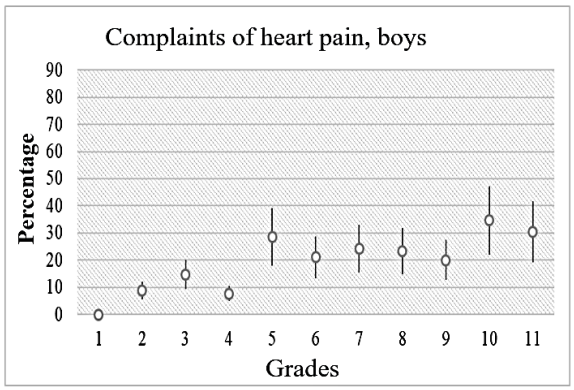


Figure 12 – Confidence intervals of number of heart pain in boys, by grades, %

Our initial research hypothesis has been confirmed for most grades. In Figure 13, we showed tangible result: the number of complaints of dizziness, fainting, and heart pain, and we can clearly see that most students complainekad of heart pain.

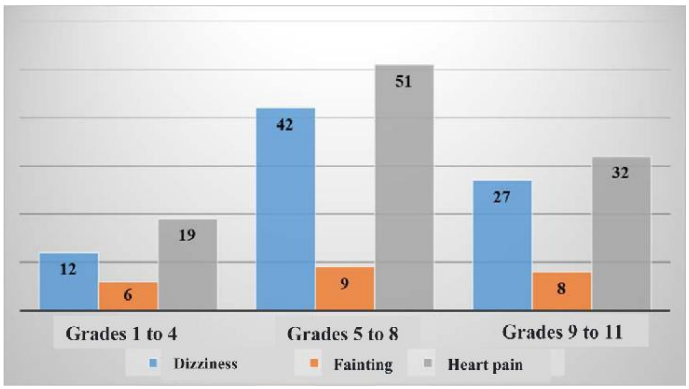


Figure 13 – Occurrence of complaints of dizziness, fainting and heart pain,%

The results we obtained from the questionnaire data on autonomic stability in the interviewed students of general education schools are consistent with the published data [11,12,13]. Girls complained of dizziness, heart pain 2-3 times more often than boys, and fainting was much less common in comparison with dizziness and heart pain in both girls and boys. The highest number of fainting

complaints was received in the tenth grade from girls: 22% (t = 4.13, p<.001). Dizziness is reported more often in any age category in contrast to fainting, as corroborated by the z-statistics. The number of complaints of heart pain by girls is almost twice as high as the number of complaints of heart pain by boys. Of three complaints studied: heart pain, dizziness, and fainting, the majority of students complained of heart pain.

Conclusion

The health survey data is indicative of numerous functional disorders in children's organs and systems detectible at early stages of the educational process. The nervous system disorders lead the list (56.8%). The data obtained suggests that adolescents of both sexes present autonomic instability symptoms.

An imbalanced autonomic nervous system manifested as headaches in 44.5% of children, statistically more often in girls than boys, becoming obvious from the sixth grade onward ($p \leq .0.01$ and $p \leq .0.05$). In the seventh and eighth grades, the differrence in complaints by gender was as high as 20%, while in the ninth grade it was 25%.

Drowsiness was reported in 53.8% of cases, with a reliable 1 per cent and 5 per cent significance for girls from the 4th grade onward to reach a gender difference of 37.5% by the 9th grade. Starting from the fourth grade, the results reported for drowsiness are significant at one per cent ($p \leq .0.01$) and five per cent ($p \leq .0.05$) level. In the ninth grade, the difference in complaints by sex is as high as 37.5%.

Complaints of fatigue and weakness occurred in 56.8% of children. There is a clear upward trend in occurrence of fatigue and weakness among pupils of both sexes from the first grade: a 2.3 times increase in girls, and a 1.3 times increase in boys by the tenth grade.

The most distinctive of all neurological symptoms are sleep disturbance complaints, which were reported in 32% of schoolchildren and correlated with all other neurological symptoms. The largest number of fainting complaints were received in the tenth grade from girls, 22% (t = 4.13, p<.001). Cardialgia as a manifestation of NCD and adaptative mechanisms of the body was found in 20.4% of cases.

We believe the combination of cephalgia with fatigue and sleep disorders deserves closer attention, as this would have a serious impact on schoolchildren's performance, interpersonal relations and how well they would digest the learning material.

Teenagers belong to the risk group for the potential development of psychosomatic disorders and hence need regular medical checkups and preventive care.

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