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**WHAT PARENTS KNOW ABOUT STUDENTS’ VISION  
PRESERVING**

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**Abstract**

Development of preventive vision preservation technologies for school students is one of the most disputed problems now. The article features the results of parents' questionnaire survey on parents' awareness of and attitude to this issue. The questionnaire survey made in 2020 involved 604 parents of school students from 32 Moscow schools. The study purpose is to understand what the parents know about the near-sightedness risk and how they facilitate their children's vision preservation. The survey results indicate that most parents have the right idea of the conventional vision preservation methods but do not take into account the new risk factors, e.g. the duration of a children's night sleep and stay in the fresh air. The survey also revealed that parents are poorly educated about the children's vision preservation methods, which is evidenced by low medical examination rate and the unwillingness to timely apply vision correction devices. Such simple measures as routine screening evaluation of school student's vision, referral to an ophthalmologist for timely vision correction and daily going out for a walk for more than 90 minutes reduce the near-sightedness development and progression risk significantly. The survey results support the need for educational and methodical support of parents and teachers in students' vision protection.

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*Keywords:* Health, myopia, survey, school, vision



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## 1. Introduction

Young generation' vision preservation is among the most urgent problems for a modern school in a mega-city. Nowadays, we see a rather significant number of studies intended to elaborate myopia preventive efforts for school-age children; however, the rate of vision disorders for school-age children continues to increase because the education is increasingly intensive.

## 2. Problem Statement

Unfortunately, the prevalence of vision disorders among the school-age children, especially such disorder as myopia, have been on the rise in the recent decades. A special term of "school myopia" has been coined. According to many researchers, children's vision starts deteriorating as they go to school, and this trend of concern is identified around the world.

The prevalence of myopia, the most common refraction disorder, is skyrocketing to as high as 80%-90% among the secondary school students in Eastern Asia. However, myopia is not confined to South Eastern Asia residents anymore. We witness the trend towards the increase in vision disorders at school, even at a smaller scale, in Europe and Russia where myopia is common among 40% children (Katargina & Tarutta, 2012; Lvov & Machekhin, 2016). Whereas myopia used to affect mostly senior pupils, this disorder has been increasingly found among junior pupils in recent decade (Chuprov et al., 2018; Libman et al., 2012). No doubt that both myopia rate and degree increase slowly but steadily as the education process continues. Therefore, the issue as to what has influenced the myopia spreading in the recent decade, i.e. as to researching the risk factors of school students' vision deterioration in order to elaborate the vision-saving technologies on this basis, is an urgent issue.

Let's consider the most significant, in the modern researchers' opinion, vision deterioration risk factors and increased myopia of a modern school student.

Inheritance is a root cause of myopia rather often. 200+ genes in most chromosomes are believed to be associated with myopia. For instance, if parents have impaired vision the probability that their child will have the same disorder as his/her parents is 60%. Scientists investigated into whether the children inherited myopia from parents genetically or whether the children had myopia because they lead the same life as their parents, including lot of work at near distance and small time of outdoor activity. The papers showed that parental myopia has significant and independent impact on early myopia development in a child (the greater the parental myopia the higher myopia risk in their children) - greater than the impact of their parents' education level, work at close distance and time outside the premises. A child has a 11 times higher myopia risk if parents have high myopia, than a child whose parents are without myopia.

Besides genetic predisposition, the studies of recent years prove convincingly the significance of environmental factors for myopia in schoolchildren including low outdoor time (Cao et al., 2020; Hagen et al., 2018; He et al., 2015; Jiang et al., 2018; Kuchma & Khramtsova, 2012; Lim et al., 2018; Read et al., 2018; Rucker et al., 2018; Shah et al., 2017; Tang et al., 2019; Tedja et al., 2018; Theophanous et al., 2018; Wu et al., 2018) and near work (reading distance less than 25 cm) (Hsu et al., 2017; Ku et al., 2018).

Researchers explain vision disorders in modern schoolchildren by the intensified training process, constant increase in work load, including technotronic one, the increased stress caused by above circumstances (preparation for and passing basic state examination and state examination, and different intermediate pass-fail exams and exams), reduction in physical exercise, changes in the normal life (lack of walks, improper diet, the burden of homework etc.) and fairly poor knowledge in health preservation and strengthening, namely, preventive vision preservation efforts not only in students and their parents but in teachers, too. A contemporary Moscow school puts a child in conditions of reduced motor activity (hypokinesia), with the static component prevailing even in children's leisure and with more time spent at the computer. This makes a significant contribution to hypokinesia and the students' chronic fatigue.

According to the Research and Development Institute of Children and Teenagers Hygiene and Health Protection at the Federal State Autonomous Institution National Medical Research Center of Children's Health of the Russian Ministry of Health, the state of modern diagnosis of vision disorders in school-age children is a major problem; e.g. the detection rate of vision disorders as low as 25%-30 %. However, during the entire study period, from the first to the eleventh grade, the number of children with impaired vision is on the rise (by approx. 5 times). Moreover, the examination findings suggest that the rate of mild myopia doubles and moderate and severe myopia rises by 10 and more times during that period. The complexity of late diagnosis is that such disorder as myopia does not manifest itself and does not worry the child at the early stages. So neither the parents nor the teachers nor even the child are concerned and approach a professional for help. Thus, myopia prevalence among the school-age children is associated, first of all, with low rate of their parents' recourse to an ophthalmologist (Kuchma & Khrantsova, 2012).

The study of the relationship between the myopia development and the time spent outdoors proved that this aspect may serve as a preventive measure against myopia and may inhibit its development. Investigators revealed that children must spend at least 2 hours a day outdoors. In this case, myopia progression stops in 70% children. The study suggested that it is the hours spent in the fresh air that represent a behavioral factor influencing the probability of myopia development in a child. The more time a child spends in the open air the lower the myopia risk.

The irrational allocation of work and leisure and the improper time budget are known to make a significant contribution to the students' fatigue and vision deterioration. For instance, the night sleep duration does not conform to the hygienists' recommendations in many cases. One in two children goes out for a walk but the duration of walks of 20% children only conforms to recommendations.

A contemporary Moscow school puts a child in conditions of reduced motor activity (hypokinesia), with the static component prevailing even in children's leisure and with more time spent at the computer. This makes a significant contribution to hypokinesia and the students' chronic fatigue. Children start using a PC even before admission to school. In the first school year, the duration of overall visual work load (computer, tablet PC, gadgets and reading) was 2 h. For the fourth year school students, the time of overall visual work load reached 3 h.

Nowadays, the new educational standards require that children must be confident PC users, and training in these competencies starts as early as in the primary school. That is to say, training passes to the entirely new level when an ordinary paper-based diary is substituted for an electronic diary, there is no

school log, it is electronic, too. Children study in most schools without notebooks and textbooks because they use the tablet PC and styluses for writing. 100% schools are equipped with multimedia facilities including an interactive board, a projector, a notebook or a PC. Moreover, these electrotechnical devices have open access to web resources. In 2018, the new Moscow Government Decree was issued to allocate funds as grants for teachers and school collectives of educational institutions for drafting the materials to arrange for the training process of school students as part of the Moscow Electronic School adopted by the Government.

Also such additional environmental factors, as dim light exposure, the use of LED lamps for homework, low sleeping hours (Gong et al., 2014; Landis et al., 2018; Pan et al., 2017; Taylor et al., 2018), and living in an urban environment (Guo et al., 2013; Zeng et al., 2018), were found.

Vision disorders of a contemporary student are also linked with rather low awareness of students, their parents and teachers regarding health preservation and strengthening, including vision protection matters (Manyukhin et al., 2007; Stepanov et al., 2018). The status of timely diagnosis of vision disorders in school-age children is a major concern in Russia, for instance, the vision impairment detection rate is as low as 25%-30%. The complexity of late diagnosis of vision disorders is that such disorder as myopia does not manifest itself and does not disturb the child at the early stages. So neither the parents nor the teachers nor even the child are concerned and approach a professional for help. Thus, myopia prevalence among the school-age children is associated, first of all, with low rate of their parents' recourse to an ophthalmologist (Ryabova et al., 2020). The test results suggested that vision disorders among 1–4 grades students (pre-myopia) and eye diseases occurred in 88.6 % schoolchildren. 50.6 % children had the pre-myopia status, i.e. most of them are in the risk group for myopia. The vision acuity deterioration that require a medical professional's advice, followup and management was found in 37.9% children. The review of vision acuity changes from 1 grade to 4 grade among boys and girls revealed the following: the pre-myopia rate dropped from 1 grade to 4 grade both in girls (from 56.0 % to 50.0 %) and in boys (from 45.4 % to 42.1 %). There is a trend towards increase in the number of cases when the vision acuity dropped both in girls (from 36.0 % to 41.7 %) and in boys (from 34.4 % to 42.1 %). The study suggested that, with the reasonably high share of the vision acuity deterioration, just 8.3% of the examined school students wore glasses or lenses, and the majority of them did not have the right idea of how to use spectacles to manage mild myopia. Moreover, the overwhelming majority of examined school students from the group with reduced vision acuity (91.7 %) were not aware of or did not care about the disease, and thus were not followed up by an ophthalmologist.

Russia does not have current national strategies to prevent diseases and to protect vision of children in educational institutions, which would include such efforts as regular vision screening, timely management of vision problems, training in work culture, increase in the time spent in the open air in the full-day school conditions (Eppenberger & Sturm, 2020; He et al., 2015). The healthcare and the education system do not cooperate in this issue.

At present, the work intended to preserve and strengthen health, in particular, to prevent and manage vision disorders in school children, is not systemic and not timely implemented in educational institutions. The school now is the base where both health improvement and preventive efforts can be taken with the greatest effect. This is due to the link between the educational and health improvement

process, the direct participation of teachers in school students' health protection and the possibility to involve parents in this process.

### 3. Research Questions

Despite the relevance of the topic, we did not find any reports on the vision impairment prevention programs in Russian educational institutions and Moscow city schools.

As part of urban research of education, the article features the test results of awareness of Moscow students' parents of the risk factors in preservation of children's vision and their attitude to vision preservation efforts.

### 4. Purpose of the Study

As part of this study, we developed a questionnaire survey for parents. The questionnaire contained closed questions about potential vision impairment risk factors, children's lifestyle and parental attitude to vision impairment prevention efforts.

The survey was attended by 604 parents of school children from 32 Moscow schools aged from 6 to 17 years old. The survey was conducted in February 2020 using the electronic system Survey Monkey for online surveys. The questionnaire was sent to school groups of parents on social networks and was anonymous and voluntary.

### 5. Research Methods

As part of this study, we developed a questionnaire survey for parents. The questionnaire contained closed questions about potential vision impairment risk factors, children's lifestyle and parental attitude to vision impairment prevention efforts.

The survey was attended by 604 parents of school children from 32 Moscow schools aged from 6 to 17 years old. The survey was conducted in February 2020 using the electronic system Survey Monkey for online surveys. The questionnaire was sent to school groups of parents on social networks and was anonymous and voluntary.

### 6. Findings

Table 1 contains parental answers to the question: "Does your child have a good vision sense", which testify to the fact that just a half of school students have normal vision.

**Table 1.** Answers to question: "Does your child have good vision sense?"

Answer	Number of respondents (%)
Yes	52
No	37
Hard to say	11

Table 2 provides answers to the question: "Otherwise, which type of vision sense impairment does your child have", which suggests that myopia is the most common disorder (more than half of answers). It is only one fifth of parents that indicate that their child wears spectacles (Table 3).

**Table 2.** Answer to question: "If none, what vision disorder does your child have?"

Answer	Number of respondents (%)
Myopia	62
Hyperopia	8
Astigmatism	15
Other	7
I don't know	8

**Table 3.** Answers to question: "Does your child wear spectacles?"

Answer	Number of respondents (%)
Yes	23
No	73
Hard to say	4

The parents who indicated myopia in their answers were asked about the spectacles wearing rules (Table 4). Less than a half of respondents was able to answer correctly by selecting the version: "Look afar in spectacles, remove (rise) them when reading and writing".

**Table 4.** If your child is short-sighted up to 3 dioptrias, how to use spectacles correctly? (choose one correct answer)

Answer	Number of respondents (%)
Not to remove spectacles when reading and writing and also when looking afar	28
Look afar in spectacles, remove (rise) them when reading and writing	42
I don't know	15

The next question was an open one and dedicated to knowledge of the impaired vision risk factors. When asked if parents are aware of the vision impairment risk factors, most of them (85%) answered affirmatively. In the next question, parents were asked to write which risk factors of vision impairment they know. Parents pointed to different factors including such as vision workload, diet, lighting, wrong posture when sitting. The greatest number of respondents believe that it's all about various gadgets. One third of respondents preferred not to answer this question.

The above means that parents do not know about the risk factors of vision impairment in full.

Virtually all parents answered the question on the child's posture when working at the table and the lighting, the proper distance of the notebook and the monitor from the eyes and the frequency of intervals in work. And most parents are not aware about the eye gymnastics.

Answers to the questions as to how often they have the children's vision sense checked and on the parents' actions if the vision impairment is found in children (Table 5, 6) suggest that the level of awareness is rather low there.

**Table 5.** Answers to questions: "How often does your children have his/her vision sense checked?"

Answer	Number of respondents (%)
Less than once per year	20
once per year	52
More than once per year	8

**Table 6.** Answers to the question: "Your actions if vision disorders were the first time found in your child during checkup?"

Answer	Number of respondents (%)
We will wear spectacles and fulfill prescriptions	75
We will not wear spectacles	25

The night sleep duration and the time spent outdoors are shown in Tables 7 and 8. The survey results suggested that most children sleep 8 to 9 h per day, however, the percentage of children sleeping less is very large.

**Table 7.** Answers to question: "What is the child's night sleep duration?"

Answers:	Number of respondents (%)
5 h	2
6 h	5
7 h	16
8 h	34
9 h	33
10 h and more	10

The Tables also suggest that children in Moscow schools stay outdoors for very few hours: most of them go out for a walk for 1 h and less every day, which is insufficient to prevent myopia.

**Table 8.** Answers to question: "How many hours per day does a child go out for a walk on school days and weekend?"

Answers:	School days	Weekend and holidays
	Number of respondents (%)	Number of respondents (%)
Less than 1 h	28	3
1 h	46	15
2 h	16	34
3 h	4	22
4 h and more	1	16
Hard to say	5	10

Then we provide the parents' answers to the question on the school pedagogue's participation in vision impairment prevention in school students (Table 9). Most parents believe that schools need such vision protection activities by a pedagogue constantly.

**Table 9.** Answers to question: " Do schools need vision protection activities by a pedagogue constantly?"

Answer	Number of respondents (%)
Yes	61
No	11
Hard to say	24
	4

## 7. Conclusion

The parents' survey demonstrated a high rate of vision acuteness deterioration in schoolchildren.

Parents showed the knowledge of conventional work rules: the proper sitting position at the table, proper lighting, the right distance from a copybook/monitor to eyes and frequency of intervals. They do not take into account the new risk factors, namely: the number of hours of night sleep and stay in the open air. The survey also revealed that parents are poorly educated about the children's vision preservation methods, which is evidenced by low medical examination rate and the unwillingness to timely apply vision correction devices. The parents noted that such work on prevention of vision impairment in children is necessary on the part of the pedagogue.

The results of the questionnaire confirm the need to organize training and methodological support for parents and teachers in vision protection matters. It is essential for a parent and a teacher to know about new risk factors for children's vision and vision impairment prevention methods.

Development and implementation of vision impairment efforts at school to prevent vision disorders is, in our opinion, one of the most urgent aspects both for the education system (direct participation of the administration and teachers in the school students' vision protection efforts and its monitoring) and public healthcare.

Such simple measures as routine screening evaluation of school student's vision, referral to an ophthalmologist for timely vision correction and daily walks for more than 90 minutes reduce the near-sightedness development and progression risk significantly.

All the above suggests that it is necessary to conduct the screening assessment of the junior students' vision and its regular monitoring and to arrange for timely vision protection efforts to reduce the number of instances of functional vision impairment and school-related myopia in children. Let's underline once again that school now is the base where both health improvement and preventive efforts may be taken efficiently, in particular, to protect vision, with involvement of pedagogues, children themselves and their parents.

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