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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии
საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman (Кириллица)**, для текста на грузинском языке следует использовать **AcadNusx**. Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - <http://www.spinesurgery.ru/files/publish.pdf> и http://www.nlm.nih.gov/bsd/uniform_requirements.html В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректур авторам не высылаются, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or computer-printed on a single side of standard typing paper, with the left margin of 3 centimeters width, and 1.5 spacing between the lines, typeface - **Times New Roman (Cyrillic)**, print size - 12 (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf

In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

**Articles that Fail to Meet the Aforementioned
Requirements are not Assigned to be Reviewed.**

ავტორთა საქურაღებოლ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დაიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx**. შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შედეგის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფხიხლებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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STUDY ON THE EFFECTS OF ART PAINTING COMBINED WITH SPORTS ON MYOPIA PREVENTION AND VISION IMPROVEMENT

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Abstract.

Objective: To investigate the current vision status and health trend of computer science students at a certain university, and to compare the effects of exercise and painting on the prevention of myopia and the improvement of visual health. **Methods:** The study involved testing and recording the vision of students from the 2020, 2021, and 2022 cohorts upon their entry to the university, analysing the changes in vision of the 2020 cohort students over three consecutive years, and recording the vision of students from the 2021 cohort who participated in basketball, table tennis, roller skating, and painting interest classes as well as non-interest classes. Statistical analysis was conducted using SPSS 18.0 software, with the chi-square (χ^2) test and chi-square trend test used for intergroup comparisons.

Results: The rate of poor vision among new students showed an increasing trend over three consecutive years, at 84.72%, 87.22%, and 89.12%, respectively. The vision development of the 2020 cohort students showed a significant downward trend over three academic years (χ^2 trend = 16.829, $P = 0.000$). After interventions involving exercise and painting, there was a significant difference in vision between students in the interest classes and those in the non-interest classes ($\chi^2 = 11.429$, $P = 0.010$), with students in the interest classes showing noticeable improvements in visual health.

Conclusion: The rate of poor vision among computer science students at a certain university is on the rise. However, through interventions involving exercise and painting, students' visual health has significantly improved, and the rate of vision decline has been effectively slowed.

Key words. Exercise and painting, vision status, myopia prevention, improvement of visual health.

Introduction.

During the 29th National "Love Your Eyes Day," the National Health Commission announced the vision survey results of adolescents in 2023: 53.6% of children exhibited poor vision, with 14.5% in preschoolers, 36% in elementary school students, 71.6% in junior high school students, and 81% in high school students. China has truly become a major country of myopia, with the incidence of myopia continuously increasing, showing trends of younger ages and higher degrees [1]. Universities are particularly hard-hit areas, especially during the COVID-19 pandemic period, with the widespread use of online courses leading to a rapid increase in the rate of myopia. In 2023, a vision test conducted by a certain University of Traditional Chinese Medicine in Chengdu on 19,191 students found that 17,630 had poor vision, making the myopia rate as high as 91.9%, with moderate to severe poor vision in 13,041 people, accounting for 68% [2]. Poor vision during students' time in school can seriously affect their learning and life, and after entering the

workforce, it can create lifelong obstacles to their work, study, and life. To enable students to better serve society and live a healthy, happy life in the future, it is urgent and important to seek effective intervention measures to change their bad eye habits, reverse the high rate of poor vision, and slow the pace of vision decline. Offering sports and painting interest classes during university extracurricular time is not only an implementation of the government's directive on "Effectively Strengthening and Improving School Physical Education and Aesthetic Education" but also allows students with common interests and hobbies to come together through organized, managed, and well-taught activities, including training, competitions, and painting from life. While enjoying these activities, students can effectively exercise both body and mind, enhancing their physical and mental health. By participating in sports and painting activities, students are encouraged to actively step out of their dormitories and classrooms, put down their phones, leave their computers, head to the sports fields, and go outdoors, reducing the time spent on close-up eye activities and sedentary behavior. Increasing outdoor activity time allows the eyes to effectively adjust and rest, improving and restoring vision [3], and thereby slowing the rate of vision degradation.

Materials and Methods.

Study Subjects: A total of 1080 freshmen from the computer science department of a certain university, enrolled over three years (2020, 2021, 2022), were selected as study subjects. This study was conducted in accordance with the management regulations of the Ethics and Ethics committee of the university and the specific requirements of the Declaration of Helsinki. This study has been ethically reviewed and approved by the Medical Ethics Committee of Wannan Medical College ([2023] Ethical Review No. 206).

Methods.

Measurement Method:

Vision was measured using the "E" chart national standard logarithmic visual acuity chart box. The vision data of students from the 2020, 2021, and 2022 cohorts upon their entry to the university were recorded, as well as the annual vision data of the 2020 cohort over three years. For the 2021 cohort, vision data at the beginning and end of the year were recorded for students in basketball, table tennis, roller skating, and painting interest classes, as well as for students not in interest classes. Normal vision was defined as uncorrected vision ≥ 5.0 , and poor vision as less than 5.0. Myopia was classified into three categories according to the standards in the textbook "Ophthalmology" by higher medical schools [4]: mild ($< -3.00D$ or 300 degrees), moderate ($-3.00D$ to $-6.00D$ or 300 to 600 degrees), and severe ($> -6.00D$ or 600 degrees).

Experimental Method:

Among the 2021 cohort computer science students, during the first semester of their second year, one basketball and painting interest class of 50 students, one table tennis and painting interest class of 30 students, and one roller skating and painting interest class of 50 students were formed, along with a control class of 50 students not participating in sports and painting activities. Vision data at the beginning and end of the first semester of the second year were measured and compared. Each interest class was scheduled for 2 activities per week, including 1 outdoor painting session, each lasting no less than 1.2 hours, while the students not in interest classes continued their normal lifestyle.

Statistical Analysis:

The collected data were entered into Excel 2016 and analyzed using SPSS 18.0 software. The chi-square (χ^2) test and χ^2 trend test were used for intergroup comparisons. A P-value < 0.05 was considered statistically significant.

Results.

Comparison of Vision Records at Entry Among 2020, 2021, and 2022 Cohorts:

The rate of poor vision at entry was lower in the 2020 cohort compared to the 2022 cohort ($P < 0.05$), with no significant difference in the rate of poor vision at entry between the 2020 and 2021 cohorts, and the 2021 and 2022 cohorts ($P > 0.05$) see Table 1.

Comparison of Vision Records Over Three Years for 2020 Cohort Students:

It was found that the rate of poor vision in third-year students was higher than that in first and second-year students ($P < 0.05$); with the progression of grades, there was an increasing trend in poor vision (χ^2 trend = 16.829, $P = 0.000$) see Table 2.

Comparison of Vision Records Between Students in Sports and Painting Interest Classes and Non-Interest Class Students Within One Semester for the 2021 Cohort:

The results showed no significant difference in the rate of poor vision at the beginning of the semester between students in sports and painting interest classes and those in non-interest classes ($\chi^2=0.194$, $P=0.979$). Non-interest class students showed no significant change in vision within one semester ($P > 0.05$), while interest class students had a significantly lower rate of poor vision at the end of the semester compared to the beginning ($P < 0.05$). The rate of poor vision at the end of the semester was lower among interest class students than among non-interest class students ($\chi^2=11.429$, $P=0.010$). see Tables 3-6.

Discussion.

The Rising Trend of Poor Vision Rates Among Computer Science Students:

The percentage of computer science students at a certain university with poor vision upon entry in the years 2020, 2021, and 2022 showed a continuous increase: 84.72%, 87.22%, and 89.12%, respectively, with an average rate of poor vision of 87.04%. The percentages of moderate and severe myopia were 22.2% and 12.5%, 20.83% and 15.28%, and 26.39% and 24.17%, respectively. The rate of poor vision continues to rise,

with the percentages of moderate and severe myopia increasing year by year. A comparison of vision records over three years for the 2020 cohort revealed an upward trend in the percentage of poor vision (χ^2 trend=16.829, $P=0.000$), with the myopia rate increasing from 84.17% at the beginning of college to 91.49% by the third year, and the percentages of moderate and severe myopia increasing from 20% and 13.06% upon entry to 27.78% and 28.06%, respectively. The deterioration of student vision is extremely severe, with the main factors causing the decline in vision including genetics, a lack of eye care awareness, and the subjective and objective factors of long hours of overuse and staying up late [5]. Furthermore, computer science students spend far more time looking at screens than the average person, have heavy academic burdens, spend less time on physical activities, and lack sufficient outdoor activity time, all of which contribute to the prevalence of myopia among students [6].

Causes of Poor Vision and the Preventive and Improving Mechanism of Sports and Painting:

The medical field has yet to reach a unified scientific conclusion on the causes of myopia. The more common belief is that environment is the main inducing factor, with prolonged near-distance eye use being the primary cause. Long-term close-up viewing can lead to fatigue or stiffness in the ciliary muscle and the internal straight muscles of the eye. When looking at distant and close objects, the muscles cannot flexibly contract and relax. As a result, when viewing distant objects, their image will form in front of the retina, causing the image on the retina to be blurry, a condition known as myopia. Primarily caused by eye muscle regulation, it is also referred to as accommodative or false myopia. This type of myopia is mostly reversible and can be improved through human intervention [7]. Sports and painting can increase the speed of blood circulation in the eyes and enhance metabolic functions, effectively improving the flexibility and adjustment function of the ciliary muscle and the refractive system. When viewing distant and close objects, the contraction and relaxation of the ciliary muscle improve its sensitivity and accuracy [8], thereby reversing and improving poor vision. At the same time, outdoor sports and painting, with the irradiation of ultraviolet rays from the sun, produce more vitamin D, which can prevent abnormal eye growth and the occurrence of myopia to some extent. More importantly, it is believed that the brighter outdoor light stimulates the retina to release dopamine, which then activates molecular cascade signals, ultimately slowing the growth of the eye and reducing the risk of myopia [9]. In various ball sports, especially those involving fast-moving small balls like table tennis, tennis, badminton, and fast-paced activities like roller skating, the eyes must follow the high-speed flight and rapid rotation of the ball. The rapid change in observation from far to near increases blood supply and enhances metabolic functions, thus restoring vision and improving function [10]. Moreover, outdoor sports and painting under brighter light, with reduced peripheral defocus, diverse spectral colors, less near work, and higher spatial frequencies, can all have a positive effect on myopia prevention and control [9].

Sports and Painting Effectively Improve Student Vision:

A comparison of the vision records at the beginning and end of the semester for students in the 2021 cohort basketball, table

Table 1. Comparison of Vision Records at Entry Among 2020, 2021, and 2022 Cohorts (n=360).

Grade	n	Normal Vision		Mild Myopia		Moderate Myopia		Severe Myopia		Poor Vision	
		n	%	n	%	n	%	n	%	n	%
2020	360	55	15.30	180	50.00	80	22.2	45	12.5	305	84.72 ^a
2021	360	46	12.78	184	51.11	75	20.83	55	15.28	314	87.22 ^{ab}
2022	360	39	10.83	139	38.61	95	26.39	87	24.17	321	89.12 ^b
χ^2		7.571									
P		0.023									

Note: Pairwise comparison between groups, completely different symbols indicate $P < 0.05$.

Table 2. Comparison of Annual Vision Records Over Three Years for the 2020 Cohort (n=360).

Year	n	Normal Vision		Mild Myopia		Moderate Myopia		Severe Myopia		Poor Vision	
		n	%	n	%	n	%	n	%	n	%
Freshman year	360	57	15.83	184	51.11	72	20.00	47	13.06	303	84.17 ^a
Sophomore Year	360	45	12.50	165	45.83	87	24.17	63	17.50	315	87.50 ^a
Junior year	360	31	8.61	128	35.56	100	27.78	101	28.06	329	91.49 ^b
χ^2		16.829									
P		0.000									

Note: Pairwise comparison between groups, different symbols indicate $P < 0.05$.

Table 3. Comparison of Vision Changes Within One Semester for Non-Interest Class Students of the 2021 Cohort (n=50).

Time	Normal Vision		Mild Myopia		Moderate Myopia		Severe Myopia		Poor Vision		
	n	%	n	%	n	%	n	%	n	%	
Beginning	8	16.00	22	44.00	12	24.00	8	16.00	42	84.00	
End	4	8.00	19	38.00	17	34.00	10	20.00	46	92.00	
χ^2		1.293									
P		0.254									

Table 4. Comparison of Vision Changes Within One Semester for Basketball and Painting Interest Class Students of the 2021 Cohort (n=50).

Time	Normal Vision		Mild Myopia		Moderate Myopia		Severe Myopia		Poor Vision		
	n	%	n	%	n	%	n	%	n	%	
Beginning	8	16.00	24	48.00	11	22.00	8	16.00	42	84.00	
End	15	30.00	23	46.00	8	16.00	5	10.00	35	70.00	
χ^2		2.869									
P		0.048									

Table 5. Comparison of Vision Changes Within One Semester for Table Tennis and Painting Interest Class Students of the 2020 Cohort (n=30).

Time	Normal Vision		Mild Myopia		Moderate Myopia		Severe Myopia		Poor Vision		
	n	%	n	%	n	%	n	%	n	%	
Beginning	4	13.33	14	46.67	7	23.33	5	16.67	26	86.67	
End	10	33.33	14	46.67	4	13.33	3	10.00	20	66.67	
χ^2		4.586									
P		0.031									

Table 6. Comparison of Vision Changes Within One Semester for Roller Skating and Painting Interest Class Students of the 2020 Cohort (n=50).

Time	Normal Vision		Mild Myopia		Moderate Myopia		Severe Myopia		Poor Vision		
	n	%	n	%	n	%	n	%	n	%	
Beginning	7	14.00	22	46.00	13	26.00	8	16.00	43	86.00	
End	14	28.00	20	40.00	10	20.00	6	12.00	36	72.00	
χ^2		4.089									
P		0.042									

tennis, roller skating, and painting interest classes, as well as non-interest class students, shows that there was a significant difference in the percentage of poor vision within one semester between students in interest classes and non-interest class students ($\chi^2=11.429$, $p=0.010$). Non-interest class students showed a declining trend in vision, with an increase in moderate and severe myopia, while interest class students experienced effective improvements in vision, with a significant decrease in the percentage of moderate and severe myopia. Some students with milder myopia even reversed their condition back to normal levels. Studies have proven that sports and painting not only enhance students' physical and mental health but also effectively strengthen the adjusting muscle groups inside and outside the eye, enhancing their ability to stretch and contract, thereby improving regulatory functions. This relieves the tension and fatigue of the ciliary muscles, effectively controlling the weakening of vision and improving and restoring some cases of mild pseudomyopia [11]. For example, long-term and continuous table tennis activity can play a beneficial auxiliary role in the treatment of pseudomyopia [12]. When comparing the visual abilities of basketball players and the general population, it was found that basketball players significantly surpassed the average person in areas such as near point convergence and halo discrimination [13]. Outdoor painting, with its bright light, vivid colors, and the visual perception of looking near and far, along with the coordination of hands, eyes, and brain, not only relieves eye fatigue but also eases anxious emotions and relaxes the mind. Sports and painting activities not only slow down the decline of vision but also allow for the recovery of mild myopia [14]. By reducing the time students spend sitting for long periods and decreasing the time they spend looking at screens, and increasing outdoor activity time, students' physical and mental health is improved, and their eyes are given a chance to relax [15]. This effectively controls the trend of deteriorating vision, allowing for a gradual restoration of function.

Conflict of interest.

The authors declare no conflicts of interest.

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