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Challenges and Optimization Strategies for School-Based Health Interventions in Adolescent Myopia Prevention and Control

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Abstract

Adolescent myopia has become a major visual health concern closely related to daily learning routines, prolonged near work, limited outdoor activity, and increasing screen use. Schools are an important setting for myopia prevention because they can organize regular screening, provide health education, manage classroom conditions, and influence students' everyday eye-use behavior. However, the effectiveness of school-based health interventions is often limited by several practical problems. Academic pressure may reduce outdoor activity and prolong continuous near work. Vision screening may not be followed by timely referral and sustained follow-up. Health education may improve awareness but fail to change daily behavior. Uneven resources and weak cooperation among schools, families, and medical institutions may also weaken intervention outcomes. This paper analyzes the main forms and challenges of school-based health interventions in adolescent myopia prevention and control, and proposes optimization strategies from the perspectives of routine school governance, closed-loop screening and follow-up, behavior-oriented health education, school-family-medical collaboration, and improvement of outdoor activity and classroom visual environment. The paper argues that school-based myopia prevention should not rely on isolated campaigns or periodic screening alone. More attention should be paid to connecting existing measures with students' daily school life, so that prevention becomes a continuous and practical part of visual health management.

Keywords: adolescent myopia, myopia prevention and control, school-based health intervention, visual health, health education, school-family-medical collaboration

1. Introduction

Myopia has become one of the most common visual health problems among adolescents. Its significance does not lie only in blurred distance vision or the inconvenience of wearing spectacles. When myopia occurs early and progresses rapidly, it increases the possibility of high myopia in later life, which may further raise the risk of serious ocular complications. For school-aged children and adolescents, myopia is also closely connected with daily learning routines, prolonged near work, insufficient outdoor exposure, and the growing use of digital devices. In this sense, adolescent myopia is not simply an individual clinical problem. It is also a public health issue shaped by school schedules, family supervision, learning habits, and access to eye-care services.

Schools occupy a central position in myopia prevention and control. Adolescents spend a large part of their day in classrooms, and many risk-related behaviors occur during school time, such as continuous reading, writing, screen-based learning, and limited outdoor activity. Compared with interventions carried out only by families or medical institutions, school-based health interventions have a clear practical advantage: they can reach students regularly and organize preventive measures in a relatively stable environment. Vision screening, health education, outdoor activity arrangements, classroom lighting improvement, and follow-up communication with parents can all be integrated into school routines.

However, the existence of school-based measures does not necessarily mean that they work well in practice. Many schools are able to arrange vision screening or health education activities, but the more difficult part lies in whether abnormal screening results are followed by timely referral, whether students change their daily eye-use behavior, and whether outdoor activity time can be protected under academic pressure. In some cases, myopia prevention becomes a periodic campaign rather than a part of ordinary school management. Students may understand the basic rules of eye protection, yet still return to long periods of near work, poor posture, short recess, and heavy screen use.

This paper focuses on the challenges and optimization strategies of school-based health interventions in adolescent myopia prevention and control. It does not aim to conduct an empirical investigation. Instead, it analyzes the main forms of current school-based interventions, identifies the practical barriers that limit their effectiveness, and proposes possible ways to improve school-based prevention through routine governance, closed-loop screening and follow-up, behavior-oriented health education, school-family-medical collaboration, and the optimization of outdoor activity and visual environment. The central argument is that the key to school-based myopia prevention is not only to introduce more intervention measures, but to make existing measures more continuous, behavior-focused, and closely connected with students' everyday school life.

2. Necessity of School-Based Health Interventions in Adolescent Myopia Prevention and Control

School-based health interventions are necessary because adolescent myopia is closely tied to the ordinary conditions of school life. The development and progression of myopia are affected by repeated daily behaviors, including long periods of near work, insufficient breaks, limited outdoor exposure, and inappropriate reading or writing posture. These behaviors do not occur only at home. For most adolescents, they are embedded in lessons, homework, examinations, digital learning, and classroom routines. If prevention is left only to families or medical institutions, many risk factors during the school day may remain unchanged.

The school setting also provides a relatively stable space for early detection and continuous prevention. Regular vision screening can help identify students with declining visual acuity before the problem becomes more serious. Health education can remind students of proper eye-use habits, while teachers can observe whether these habits are actually followed in daily learning. Outdoor activities and physical education can reduce prolonged near work and increase exposure to natural light. Classroom environment management, including lighting, desk-chair matching, and screen-use arrangements, can also reduce avoidable visual strain. These measures are difficult to achieve through one-time clinical advice alone, but they can be repeatedly reinforced in schools.

Another reason for emphasizing school-based intervention is that adolescents are still in the process of forming health behaviors. Many students know that they should protect their eyesight, but this knowledge is easily weakened by academic pressure, peer habits, and convenience. A school can shape the environment in which these choices are made. For example, if recess is protected, outdoor activity is encouraged, and teachers pay attention to reading distance and posture during class, eye protection becomes part of daily routine rather than a slogan on a poster. In this sense, the school is not merely a place for delivering health knowledge. It is a place where visual health behaviors can be practiced, corrected, and gradually stabilized.

School-based intervention is also important for connecting families and medical services. Parents may notice vision problems late, or they may not fully understand the meaning of screening results. Medical institutions can provide professional diagnosis and treatment, but they usually have limited access to students' everyday learning environment. Schools can serve as an intermediate link. They can organize screening, inform parents of abnormal findings, guide students to seek timely medical evaluation, and cooperate with health professionals in follow-up management. Without this connection, myopia prevention may become fragmented: schools screen, parents worry, hospitals diagnose, but no one follows whether the student's daily habits have actually changed.

For these reasons, school-based health interventions are not optional additions to adolescent myopia prevention. They are a practical necessity. The effectiveness of myopia control depends not only on medical correction after vision decline has occurred, but also on whether preventable risks in everyday school life can be reduced. A well-functioning school-based intervention system can turn prevention from occasional publicity into a continuous process that combines screening, education, environmental improvement, outdoor activity, and coordinated follow-up.

3. Main Forms of School-Based Health Interventions

3.1 Vision Screening and Health Monitoring

Vision screening is usually the most direct form of school-based myopia prevention. Compared with waiting for students or parents to notice blurred vision, regular screening allows schools to identify visual decline at an earlier stage. This is particularly important for adolescents because myopia may progress quietly. Some students may adapt to unclear distance vision, sit closer to the blackboard, or rely on classmates' notes without immediately reporting the problem. School-based screening can make these changes visible before they lead to

more serious visual impairment.

In practice, vision screening should not be understood as a simple measurement of visual acuity. Its value depends on whether the results are recorded, interpreted, communicated, and followed up. A student with abnormal screening results needs more than a notification slip. The school should be able to inform parents clearly, remind them of the need for professional eye examination when necessary, and keep track of whether further assessment has been completed. Without this process, screening may become a routine administrative task: data are collected, but the student's visual health risk is not truly managed.

Health monitoring also helps schools observe changes over time. A single screening result can only show the student's current visual status, while repeated records can reveal whether visual acuity is stable, declining slowly, or worsening rapidly. This distinction matters because students with rapid progression may need closer attention, more timely referral, and stronger behavioral guidance. For schools, maintaining visual health records can also help identify class-level or grade-level problems, such as heavy near-work pressure, inadequate outdoor time, or poor classroom lighting.

At the same time, school-based monitoring should avoid becoming merely a numerical exercise. The purpose is not to rank students by visual acuity, nor to place pressure on teachers or parents through simple indicators. Its real function is to support early warning and timely intervention. Screening data should be connected with health education, classroom management, parental communication, and medical referral. Only when these links are in place can vision screening become the starting point of prevention rather than the endpoint of school responsibility.

3.2 Health Education and Daily Behavior Guidance

Health education is another basic component of school-based myopia prevention, but its effect depends on whether it can move beyond general reminders. In many schools, students are repeatedly told to protect their eyesight, reduce screen time, maintain a proper reading distance, and take breaks after prolonged near work. These messages are necessary, yet they may have limited influence if they remain at the level of slogans or occasional lectures. Adolescents often know the basic rules of eye protection, but knowledge alone does not always lead to stable behavior.

Daily behavior guidance should therefore be built into ordinary learning situations. Teachers can remind students to keep an appropriate reading and writing distance during class, adjust poor posture when it appears, and encourage short visual breaks after continuous near work. These small interventions may seem less formal than a health education lecture, but they are closer to the moments when visual strain actually occurs. For adolescents, behavior is often shaped by repeated correction in familiar settings rather than by one-time information delivery.

Screen use also needs more specific guidance. With the expansion of digital learning, electronic devices have become part of school life. The problem is not simply whether screens are used, but how long they are used, under what lighting conditions, at what distance, and whether breaks are arranged. Schools should avoid treating digital teaching as automatically harmful or automatically efficient. A more practical approach is to set clear rules for screen-based learning, reduce unnecessary continuous screen exposure, and help students recognize symptoms such as eye fatigue, dryness, blurred vision, or headache.

Health education should also pay attention to students' ability to manage their own eye-use behavior. Adolescents cannot rely only on teachers' reminders. They need to understand when to stop near work, when to look into the distance, when to report visual discomfort, and why early correction matters. In this sense, daily behavior guidance is not only about preventing wrong posture or excessive screen time. It is also about helping students develop a basic awareness of visual health and a more responsible attitude toward their own eye-use habits.

3.3 Outdoor Activity and Classroom Environment Improvement

Outdoor activity is one of the most practical measures that schools can use in myopia prevention. Its value is not limited to physical exercise. For students who spend long hours reading, writing, and looking at screens, outdoor time helps interrupt continuous near work and increases exposure to natural light. These two conditions are closely related to visual health. In school practice, however, outdoor activity should not be understood only as formal physical education classes. Recess, morning exercises, extracurricular sports, and outdoor class activities can all become part of myopia prevention if they are protected in the daily timetable.

The difficulty is that outdoor activity is often the first part of the school day to be reduced when academic tasks increase. Recess may be used for homework correction, test preparation, or extra exercises. Physical education may also be affected by examination pressure, safety concerns, weather, or limited campus space. Once this happens, myopia prevention loses an important daily mechanism. For this reason, schools need to treat outdoor activity as a health requirement rather than a flexible arrangement that can be easily replaced by classroom study.

Classroom environment improvement is another important form of intervention. Poor lighting, unsuitable desk and chair height, unclear blackboard writing, unreasonable seating arrangements, and prolonged use of multimedia screens may all increase visual strain. These factors are not always noticed by students themselves, but they shape eye-use conditions throughout the school day. Regular checks of classroom lighting, desk-chair matching, screen brightness, and viewing distance can help reduce avoidable risks. This is especially important for younger adolescents, who may not yet have stable reading posture or enough awareness of visual fatigue.

Outdoor activity and classroom environment improvement should be considered together because both concern the conditions in which students use their eyes every day. Health education tells students what they should do, but the school environment determines whether those behaviors are realistic. If students are asked to protect their eyesight while recess is shortened, classrooms are poorly lit, and screen-based teaching is used without breaks, the message becomes difficult to follow. A more effective school-based intervention should therefore combine behavioral guidance with changes in the physical and organizational environment of the school.

4. Challenges in School-Based Health Interventions

4.1 Tension Between Academic Pressure and Visual Health Protection

One of the most persistent challenges in school-based myopia prevention is the tension between academic pressure and visual health protection. Most preventive measures require time and space: students need breaks after near work, enough outdoor activity, appropriate reading distance, and reduced continuous screen exposure. These requirements are reasonable from a health perspective, but they may conflict with the actual rhythm of school learning. When class schedules are tight and academic performance remains a major concern for schools and families, visual health measures can easily be pushed aside.

This tension is especially clear in the use of recess and after-class time. In principle, recess should allow students to rest their eyes, move around, and look into the distance. In practice, it may be occupied by homework, test preparation, unfinished classroom tasks, or quiet indoor activities. Even when schools formally arrange physical education or outdoor activity, these activities may be shortened or weakened during examination periods. As a result, myopia prevention exists in policy and school notices, but the daily routine still encourages long periods of near work.

Homework and digital learning further complicate this problem. Students may spend many hours on reading and written assignments after school, while online learning platforms and electronic devices add another layer of visual burden. Schools may emphasize eye protection during the day, but the total amount of near work often extends beyond school hours. If academic tasks are not coordinated with visual health requirements, school-based intervention can only reduce part of the risk, while the broader learning environment continues to promote myopia progression.

The difficulty is not that schools are unaware of myopia prevention. Many schools already organize screening, eye exercises, health education, and outdoor activities. The problem is that these measures compete with academic demands that are seen as more urgent. Under this pressure, eye health is sometimes treated as an additional responsibility rather than a condition for students' long-term development. This makes the effectiveness of intervention unstable. When prevention depends mainly on campaigns or reminders, it is likely to weaken whenever academic pressure increases.

For school-based intervention to work, visual health protection must be placed within the structure of daily teaching rather than outside it. The key challenge is therefore not only how to persuade students to protect their eyes, but how to adjust school routines so that healthy eye-use behavior becomes possible. Without this adjustment, health education may remain correct in principle but difficult to practice in students' real learning life.

4.2 Weak Continuity of Screening, Referral, and Follow-Up

Another major weakness lies in the discontinuity between screening, referral, and follow-up. Vision screening is relatively easy for schools to organize because it can be arranged at a fixed time and completed for many students within a short period. The more difficult work begins after the screening. Once a student is found to have declining visual acuity or suspected myopia, the result needs to be explained to parents, followed by professional examination when necessary, and connected with later behavioral guidance. In many cases, this chain is not strong enough.

A common problem is that screening results are communicated, but not truly managed. Parents may receive a notice from the school, yet the notice may not clearly explain the seriousness of the result or the need for timely ophthalmic assessment. Some parents may assume that a slight decline in vision is not urgent, especially if the student can still manage daily learning. Others may delay medical consultation because of time, cost, or limited awareness of myopia progression. When this happens, school screening identifies risk but does not necessarily

lead to intervention.

Follow-up is even harder to sustain. Schools may know which students have abnormal screening results, but they may not have enough staff, professional knowledge, or time to track whether each student has received further examination or whether the recommended measures have been followed. Medical institutions, on the other hand, can provide diagnosis and advice, but they usually do not see how the student uses their eyes in school every day. As a result, responsibility is easily divided: schools complete screening, parents arrange treatment if they choose to, and hospitals provide clinical advice, but no actor fully oversees the whole process.

This weak continuity reduces the value of early detection. Myopia prevention depends not only on finding problems early, but also on acting early. If abnormal results are not followed by timely referral, corrected optical management, daily behavior adjustment, and repeated monitoring, screening becomes a record of decline rather than a starting point for prevention. For students whose myopia progresses quickly, delayed follow-up may mean losing an important window for control.

The issue is therefore not simply a technical problem of screening frequency. It is a problem of connection. A more effective school-based system needs to make each step lead naturally to the next: screening should trigger clear feedback, feedback should guide medical referral when needed, referral results should inform school and family management, and later monitoring should check whether the student's visual risk is changing. Without this continuity, even regular screening may have limited practical effect.

4.3 Limited Transformation from Health Knowledge to Daily Behavior

A further challenge is that health knowledge does not always become daily behavior. In school-based myopia prevention, students are often familiar with basic advice: keep a proper reading distance, sit upright, avoid using screens for too long, take breaks during near work, and spend more time outdoors. These messages are not difficult to understand. The problem is that they are easy to forget or ignore when students return to ordinary learning situations.

This gap is especially visible in classroom behavior. A student may know the correct reading posture, but still lower the head when writing for a long time. A student may understand the need for visual breaks, but continue reading or using a device because the task has not been finished. Some students notice eye fatigue but do not report it, either because they think it is normal or because they do not want to interrupt their study. In these situations, the obstacle is not lack of information. It is the weak conversion of information into repeated, stable habits.

Health education can also lose its effect when it is delivered in a general and detached way. Posters, lectures, and short campaigns may raise awareness for a period of time, but they do not necessarily change how students behave during class, homework, recess, and screen-based learning. Myopia prevention requires small actions repeated every day. If education is not connected with these specific moments, it may remain a form of correct knowledge rather than practical guidance.

Another reason for the weak transformation is that adolescents are not always able to manage visual health risks on their own. Their behavior is influenced by teachers' expectations, peer habits, academic tasks, family supervision, and the design of the school environment. Asking students to "protect their eyes" is not enough if the surrounding routine still encourages long periods of near work and limited outdoor activity. In this sense, behavior change cannot rely only on individual self-discipline.

School-based intervention therefore needs to pay more attention to the process of habit formation. The aim of health education should not be merely to make students know what myopia prevention means, but to help them practice it in ordinary situations. This requires reminders during learning activities, correction of poor posture, protected breaks, reasonable screen-use rules, and cooperation from teachers and parents. Only when health knowledge is repeatedly linked to daily behavior can it become part of students' visual health protection.

4.4 Uneven Resources and Insufficient Collaborative Support

Uneven resources also limit the quality of school-based myopia prevention. Different schools may face very different conditions in terms of classroom lighting, desk and chair equipment, campus space, health personnel, and access to professional eye-care services. Some schools can organize regular screening, maintain visual health records, and invite medical professionals to provide guidance. Others may only be able to complete basic vision checks, with limited capacity for follow-up or individualized advice. These differences make school-based intervention uneven in practice.

The gap is more obvious when professional support is needed. Myopia prevention is not only a matter of school management. It involves visual acuity screening, refractive assessment, risk identification, optical correction, and advice on myopia control. Teachers and school health workers can play an important role in daily supervision, but they cannot replace professional eye-care services. When schools lack stable cooperation with

medical institutions, screening results may not be interpreted accurately, and students with visual decline may not receive timely guidance.

Family support is another unstable link. Some parents pay close attention to their children's vision and respond quickly to school notices. Others may not recognize the importance of early intervention, or may focus only on whether the child needs glasses. At home, students' eye-use habits are also shaped by homework time, screen use, lighting conditions, and parental supervision. If families do not cooperate with schools, the effect of school-based intervention is easily weakened after students leave the campus.

Collaboration among schools, families, and medical institutions often remains loose. Each side may take some responsibility, but the responsibilities are not always clearly connected. Schools may screen and notify, parents may decide whether to seek medical care, and hospitals may provide diagnosis and advice. Yet the information does not always return to the school, and the student's daily habits may not be adjusted accordingly. In this situation, prevention becomes fragmented rather than continuous.

For this reason, resource gaps and weak collaboration should be considered together. Even when a school is willing to carry out myopia prevention, its effectiveness depends on whether it has the material conditions, professional support, parental cooperation, and communication channels needed to sustain the work. Without these supports, school-based health interventions may remain formal and uneven, with stronger effects in some schools and much weaker effects in others.

5. Optimization Strategies for School-Based Myopia Prevention and Control

5.1 Integrating Myopia Prevention into Routine School Governance

Myopia prevention should be built into routine school governance rather than treated as a temporary health campaign. In many schools, eye health work is most visible during screening periods, health education weeks, or special inspection activities. These arrangements are useful, but they cannot replace daily management. The risks that contribute to myopia are repeated every day through reading, writing, homework, screen use, classroom lighting, and limited outdoor activity. If prevention is only activated at certain moments, it is difficult to influence the routines in which visual strain actually occurs.

A more effective approach is to make myopia prevention part of ordinary school organization. This means that visual health should be considered when schools arrange timetables, recess, homework, physical education, classroom seating, and the use of digital teaching equipment. For example, recess should not be easily occupied by extra academic tasks, and long periods of continuous near work should be avoided where possible. When screen-based teaching is used, teachers should also consider viewing distance, brightness, duration, and breaks. These details may seem small, but they determine whether students can practice healthy eye-use behavior during the school day.

Routine governance also requires clearer responsibilities within the school. Myopia prevention cannot rely only on school doctors or health teachers. Class teachers, subject teachers, physical education teachers, and school administrators all affect students' visual health in different ways. Class teachers may notice changes in students' vision or posture. Subject teachers can adjust classroom rhythm and remind students to rest their eyes. Physical education teachers help protect outdoor activity time. Administrators are responsible for resources, schedules, and environmental improvement. When these responsibilities are distributed clearly, myopia prevention becomes a shared part of school management rather than a task assigned to one department.

At the same time, schools should avoid turning myopia prevention into another form of paperwork. The aim is not to produce more records or formal reports, but to change the conditions of daily learning. A practical governance system should focus on whether students receive timely screening feedback, whether outdoor activity is actually protected, whether poor classroom conditions are corrected, and whether teachers can integrate eye-health reminders into ordinary teaching. In this way, myopia prevention can become more stable and less dependent on short-term campaigns.

Integrating myopia prevention into routine school governance does not mean weakening academic work. Rather, it recognizes that visual health is part of students' long-term learning capacity. A school routine that ignores eye health may support short-term academic intensity, but it also increases the risk of visual problems that can affect students for years. The purpose of governance optimization is therefore to make health protection compatible with daily teaching, so that myopia prevention is not an extra burden, but a basic condition of a healthier learning environment.

5.2 Building a Closed-Loop System for Screening, Referral, and Follow-Up

A closed-loop system is needed to prevent vision screening from becoming a one-time administrative task. In school-based myopia prevention, screening is only the first step. Its real value depends on what happens after abnormal results are found. If students with declining visual acuity are only recorded or briefly notified to

parents, the opportunity for early intervention may be missed. Screening should therefore be connected with referral, medical assessment, behavior guidance, and later monitoring.

The first step is to make feedback more understandable and actionable. Parents should not receive only a simple statement that the child's vision is below standard. The school should explain what the result may indicate, why further assessment may be needed, and what steps parents are expected to take. For students with suspected myopia or rapid decline, the notice should clearly recommend timely examination by professional eye-care services. This kind of feedback can reduce parental delay and help families understand that myopia control is not limited to buying glasses.

Referral should also be more organized. Schools do not need to replace medical institutions, but they can guide families toward appropriate professional assessment. After referral, the results should be brought back into school health management where possible. For example, if a student is diagnosed with myopia or advised to reduce near-work strain, the school can pay closer attention to seating, classroom posture, screen exposure, and outdoor activity participation. This does not require teachers to provide medical treatment. It means that clinical advice should have a place in the student's daily learning environment.

Follow-up is the part most likely to be neglected, but it is also the part that gives screening long-term meaning. Schools can establish simple visual health records to track students with abnormal results, repeated decline, or high risk of progression. These records should not be used to label students. They should help teachers and school health workers know who needs closer attention and whether previous advice has been acted on. For students whose vision continues to worsen, parents should be reminded again, and health professionals should be consulted when necessary.

A closed-loop system also requires clear communication among schools, families, and medical institutions. Screening data, parental response, referral results, and later observation should not remain isolated. When these links are connected, prevention becomes more continuous: schools identify risks, parents arrange professional assessment and support home management, medical institutions provide diagnosis and guidance, and schools continue to observe daily eye-use behavior. This process is more useful than repeated screening alone, because it turns early detection into actual intervention.

The purpose of building such a system is not to make school health work more complicated. It is to ensure that each step has a clear next step. Screening should lead to feedback, feedback should lead to referral when needed, referral should guide daily management, and follow-up should check whether the student's visual health risk has changed. Only in this way can school-based myopia prevention move from periodic measurement to continuous protection.

5.3 Strengthening Behavior-Oriented Health Education

Health education should be directed more clearly toward behavior change. In myopia prevention, students usually do not lack basic information. Many of them have heard that they should keep a proper reading distance, take breaks after near work, reduce unnecessary screen time, and spend more time outdoors. The difficulty is that these rules are easily separated from actual school life. Once students return to homework, examinations, classroom tasks, or digital learning, correct knowledge may quickly give way to convenience and academic pressure.

For this reason, school health education should be less like occasional publicity and more like daily behavioral guidance. Instead of only telling students that myopia is harmful, teachers can help them notice concrete moments of risk: lowering the head too close to the desk, reading continuously without rest, using a screen for a long time, or staying indoors during breaks. These moments are where intervention is most needed. A short reminder during class or after a period of near work may have more practical value than a formal lecture that students listen to once and then forget.

Behavior-oriented education also requires clear and simple rules that students can actually follow. For example, schools may guide students to keep an appropriate distance when reading and writing, look into the distance during recess, avoid using electronic devices in dim light, and report symptoms such as eye fatigue, blurred distance vision, or frequent squinting. These rules should not be presented as abstract health slogans. They should be connected with ordinary learning scenes, so that students know what to do during class, while doing homework, when using a tablet, and after noticing visual discomfort.

Teachers play an important role in this process. They do not need to become eye-care specialists, but they can help turn health advice into classroom habits. Subject teachers can arrange brief visual breaks after intensive reading or writing. Class teachers can observe posture and remind students who often squint or move too close to the blackboard. Physical education teachers can encourage outdoor participation rather than allowing recess and activity time to become passive indoor rest. When different teachers give consistent guidance, students are more likely to treat eye protection as part of school routine.

Health education should also avoid placing all responsibility on students. Adolescents' behavior is shaped by the environment around them. If homework remains excessive, recess is shortened, and screen-based learning has no clear limits, students will find it difficult to maintain healthy eye-use habits even when they understand the risks. Behavior-oriented education therefore needs support from school management, family supervision, and classroom organization. Its goal is not only to make students "know more," but to make healthy choices easier to practice in daily life.

5.4 Improving School-Family-Medical Collaboration

School-family-medical collaboration should be built around clear responsibilities rather than general calls for cooperation. In myopia prevention, each side has a different role. Schools are closest to students' daily learning routines. Families influence homework habits, screen use, sleep, and after-school activities. Medical institutions provide professional diagnosis, correction, and guidance on myopia control. If these roles are not connected, prevention easily becomes fragmented: schools screen, parents receive notices, hospitals give advice, but the student's daily behavior may remain unchanged.

Schools should act as the organizer of daily prevention. They can arrange vision screening, maintain visual health records, observe changes in students' learning behavior, and communicate abnormal results to parents in a timely way. For students who show repeated vision decline, schools should not stop at a single reminder. They can encourage parents to seek professional assessment and pay closer attention to the student's classroom seating, reading posture, outdoor activity, and screen exposure. This kind of management does not mean that schools take over medical responsibility. It means that schools help connect clinical advice with ordinary school life.

Families are responsible for the part of eye-use behavior that schools cannot fully control. Much near work occurs after school, especially homework, extracurricular study, and recreational screen use. Even if schools protect outdoor activity during the day, the effect may be weakened if students spend long hours on digital devices at night or study under poor lighting. Parents therefore need to understand screening results, arrange timely eye examinations when necessary, and supervise home-based eye-use habits. Their role is not only to decide whether a child should wear glasses, but to support long-term visual health management.

Medical institutions provide the professional basis for prevention and control. Screening results from schools can indicate possible risk, but diagnosis and individualized guidance require professional evaluation. Ophthalmologists and optometrists can help distinguish between simple visual acuity decline and clinically significant myopia, assess progression risk, and give advice on correction and control measures. When medical advice is communicated back to schools and families in an understandable way, it becomes easier to translate professional recommendations into daily management.

The key is to create a communication mechanism that allows information to move between these three sides. Schools should inform parents clearly, parents should report relevant examination results when appropriate, and medical institutions can provide guidance that is practical for school and home settings. For example, a student with rapid progression may need not only optical correction, but also closer attention to outdoor time, near-work duration, and regular review. Without communication, these recommendations may stay within the clinic and fail to affect daily habits.

Improving collaboration does not require a complicated system at the beginning. A workable model may start with a few concrete tasks: clear feedback after screening, referral reminders for students at risk, parental confirmation of follow-up, and basic guidance from medical professionals for schools. Over time, these tasks can form a more stable prevention network. The purpose is to make sure that no single actor is left to handle myopia prevention alone, and that students receive consistent support across school, home, and medical settings.

5.5 Optimizing Outdoor Activity and Visual Environment

Outdoor activity should be treated as a regular part of myopia prevention, not as an activity that can be reduced whenever academic tasks become heavier. For adolescents, outdoor time helps break long periods of near work and provides exposure to natural light. These conditions cannot be replaced by eye exercises or classroom reminders alone. Schools therefore need to protect recess, physical education, and other outdoor activities in the daily timetable. When possible, short outdoor breaks and outdoor class activities can also be arranged, especially after periods of intensive reading, writing, or screen use.

The key is not only to increase the number of outdoor activities on paper, but to make sure they actually happen. In some schools, outdoor time may be formally arranged but weakened in practice because students stay indoors, teachers use breaks for unfinished teaching tasks, or activity time is occupied by test preparation. To avoid this, schools should set clearer rules for protecting recess and physical education. Teachers also need to share the understanding that outdoor activity is not unrelated to learning. It supports students' long-term visual health and helps reduce the risks created by prolonged classroom study.

The classroom visual environment also needs regular improvement. Students spend many hours in classrooms, so small environmental problems may accumulate into continuous visual strain. Lighting should be sufficient and stable, desks and chairs should match students' height as much as possible, and blackboards or screens should be clear from different seating positions. When multimedia equipment is used, schools should pay attention to screen brightness, viewing distance, font size, and the duration of continuous use. These details are easy to overlook, but they directly affect students' daily eye-use conditions.

Seating arrangements should also be managed with visual health in mind. Students with visual decline should not simply be moved closer to the blackboard without further attention. A change of seat may help them see temporarily, but it does not address the underlying need for professional assessment or myopia control. Schools can rotate seats reasonably, observe whether students often squint or lean forward, and remind parents when such behaviors appear. In this way, classroom management can become an early warning point rather than a passive response to poor vision.

Outdoor activity and environmental optimization should work together. If students are told to protect their eyesight but remain in poorly lit classrooms, use screens for long periods, and lose recess time to academic tasks, health education will be difficult to translate into behavior. A healthier school environment gives students a real chance to follow visual health guidance. For this reason, optimizing outdoor activity and classroom conditions is not only a logistical issue. It is part of the basic support system that makes school-based myopia prevention possible.

6. Discussion

School-based myopia prevention should be understood as a long-term public health practice rather than a collection of isolated school activities. Vision screening, health education, outdoor activity, classroom environment improvement, and parental communication are all necessary, but none of them can work well on their own. The real difficulty lies in whether these measures can be connected with students' everyday learning routines. If screening is not followed by referral and management, if health education does not change daily behavior, or if outdoor activity is repeatedly sacrificed to academic tasks, the intervention may exist in form but remain weak in effect.

A key issue is the gap between knowing and doing. Most schools and families already recognize that myopia prevention is important. Students also know many basic rules of eye protection. The problem is that visual health behaviors are often fragile in the face of school routines. Long periods of reading and writing, examination pressure, homework, digital learning, and indoor recess all make unhealthy eye-use habits easier to continue. This means that myopia prevention cannot rely only on awareness raising. It has to enter the ordinary structure of teaching, homework, breaks, classroom management, and family supervision.

Another point worth stressing is that schools should not be asked to solve the problem alone. Schools are important because they can organize students and influence daily routines, but they cannot replace families or medical institutions. Parents determine much of what happens after school, including homework habits, recreational screen use, sleep, and lighting conditions at home. Medical institutions provide diagnosis, correction, and professional advice that schools cannot provide by themselves. A more realistic prevention model should therefore treat schools as the coordinating setting, while families and medical institutions provide support on the parts that schools cannot cover.

The discussion also shows that myopia prevention needs to shift from periodic intervention to continuous management. Many measures are easier to carry out as campaigns: a screening week, a health lecture, a poster display, or a short-term outdoor activity requirement. These activities can raise attention, but adolescent myopia develops through repeated exposure to daily risks. Prevention should therefore be judged not only by whether activities are carried out, but by whether they change daily patterns of eye use. The more important questions are whether students have enough outdoor time, whether screen-based teaching is controlled, whether abnormal screening results lead to follow-up, and whether parents respond to school feedback.

In this sense, the optimization of school-based interventions is not simply about adding more measures. It is about making existing measures more connected and more practical. A school may already have screening, health education, physical education, and classroom management, but these components may remain separate. When they are linked into a routine system, their value becomes stronger. Screening can identify risk, health education can guide behavior, outdoor activity can reduce near-work pressure, classroom improvement can lower environmental strain, and collaboration with families and medical institutions can support follow-up. The effectiveness of prevention depends on this connection.

Future school-based myopia prevention should therefore pay more attention to implementation quality. Measures that appear sound in principle may fail if they are too general, too temporary, or too detached from students' actual school life. The practical direction is to make prevention visible in daily routines: protected recess,

reasonable homework arrangements, timely feedback after screening, behavior-oriented health education, regular classroom environment checks, and clear communication with parents. These are not dramatic reforms, but they are the kinds of changes that can make prevention more stable and less dependent on short-term attention.

7. Conclusion

School-based health interventions play an important role in adolescent myopia prevention and control because many risk factors are embedded in students' daily learning routines. Vision screening, health education, outdoor activity, classroom environment improvement, and school-family-medical communication can all contribute to visual health protection. Their value, however, depends on whether they are carried out as continuous practices rather than occasional activities.

The main challenge is not the complete absence of intervention measures, but the weak connection between them. Academic pressure may reduce outdoor activity and prolong near work. Screening may identify visual decline but fail to lead to timely referral and follow-up. Health education may improve awareness but not change daily behavior. Resource gaps and insufficient collaboration may also weaken the support that schools can provide. These problems show that adolescent myopia prevention cannot rely only on reminders, publicity, or periodic screening.

To improve school-based myopia prevention, schools need to integrate visual health protection into routine governance. Screening should be connected with feedback, referral, and follow-up. Health education should focus on concrete behaviors in daily learning. Outdoor activity and classroom visual conditions should be protected and regularly improved. Schools, families, and medical institutions also need clearer division of responsibilities and more stable communication.

In general, effective myopia prevention requires a shift from isolated measures to a connected system of daily management. Only when preventive actions are built into students' ordinary school and home life can school-based health interventions better support adolescent visual health and reduce the risk of myopia progression.

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