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Impact Of Uncorrected Refractive Errors On Academic Performance In Students

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Abstract

Introduction: Uncorrected refractive errors (UREs) are among the leading causes of visual impairment in school-aged children and adolescents. These vision problems often go unnoticed and untreated, resulting in difficulties in reading, writing, and classroom engagement. Consequently, UREs can negatively affect students' academic performance and overall learning outcomes.

Objective: To determine the impact of uncorrected refractive errors on the academic performance of students.

Methodology: A cross-sectional study was conducted among 300 students selected through convenient sampling. Data were collected using a structured questionnaire assessing visual symptoms, academic performance, classroom engagement, and awareness regarding eye health. Visual difficulties such as blurred vision, headache, and eye strain were evaluated. Statistical analysis was performed to determine associations between visual problems and academic performance, including mean comparisons and hypothesis testing.

Results: The findings revealed that a significant proportion of students experienced visual difficulties, including problems in seeing the board, near work issues, and reduced attention in class. Students with uncorrected refractive errors showed comparatively lower academic performance and increased symptoms of eye strain and headaches. A strong association was observed between visual impairment and

reduced academic outcomes. Moreover, students reported noticeable improvement in academic performance after vision correction, highlighting the importance of timely diagnosis and management.
Conclusion: Uncorrected refractive errors have a substantial negative impact on students' academic performance and classroom participation. Early detection, regular eye examinations, and proper vision correction are essential to improve educational outcomes and quality of life among students.

Introduction

One of the fundamental senses that is critical to learning, personal development, and grooming is vision. About 80% of pupils learn by visual observation, such as writing, reading, and taking part in academic activities, according to study. Thus, improved learning, concentration, and cognitive abilities depend on having clear vision. Students' overall development physical, emotional, psychological, intellectual, professional, and social may be negatively impacted by poor vision(Lawrence Sao Babawo, 2024). For each student to make proper physical and academic progress good, vision is essential. Since a student's ability to learn and function depends on their visual cues, vision impairment can affect a child's emotional, neurological, cognitive and physical development by possibly reducing the variety and types of record and experiences that are used to process a student's health(Bilal & Words, 2022). Nearly 70% of learning is accomplished through eye engagement, and out of five people, one has a manageable refractive error that, if left untreated or unidentified for an extended period of time, can result in poor adaptation and poor academic performance (Lawrence Sao Babawo, 2024).

Refractive errors are a condition of an eye in which rays of light from infinite or any object focus in front and behind the retina instead of on the retinal area at the fovea. If this condition is not corrected, the person's vision becomes blurry and their eyes become myopic, hyperopic, or astigmatic due to changes in the curvatures or axial length of the eye. Blurred vision is a result of refractive error. It is commonly divided into two categories: cylindrical (astigmatism) and spherical error that includes myopia, hyperopia. Myopia is a disorder where images focus in front of the eye's retina, impairing vision, particularly for far-off objects. A concave lens is used in treatment to correctly focus light onto the retina. Hyperopia is a condition when accommodation is at rest, it causes images to focus behind the retina of the eye, making it easier to see distant objects than close ones. A convex lens is used in treatment to correctly focus light onto the retina. Astigmatism is a refractive disorder in which, when light beams from infinity focus on different focal points. Blurred vision is the result of asymmetric light beam refraction via the cornea or crystalline lens. A cylindrical lens is used in treatment to correctly focus that focal point on retina which helps individual to see objects clearly(Feroz et al., 2021).

A condition brought on by eye strain or overwork, frequently during close-up work, reading, or other strong focus activities like computer screens. Blurred vision, headaches, eye pain, epiphora, are typical symptoms. It can result frequently with refractive problems. When reading, students may hold objects closer to their eyes, which would increase convergence and exacerbate asthenopia. To reduce all symptoms of ocular fatigue, all patients with uncorrected refractive abnormalities should receive proper and sufficient repairs. Refractive errors must be identified as soon as possible because they can cause blindness and other eye conditions including amblyopia if left untreated(Shahid et al., 2023) . These refractive defects can have detrimental effects on both health and vision-related quality of life if they are not corrected or are not repaired correctly. Since practically all academic-related tasks are completed up close on a typical learning institute day, having comfortable and clear near eyesight is essential for completing all of their assignments. It is anticipated that academic-related performance is significantly influenced by good vision, including

visual acuity, accommodation, and binocular vision function. A student's academic performance is negatively impacted if their uncorrected refractive defects is high. A student's health is also impacted by high uncorrected refractive error because it might result in asthenopic symptoms. Students with refractive error most frequently complain of asthenopia, which includes headache, wetness, eyestrain etc(Lawrence Sao Babawo, 2024).

In one or both eyes, myopia was defined as a spherical power of ≥ - 0.5 diopters. A spherical power of ≥ + 1.50 diopter sphere in one or both eyes was defined as hyperopia. A cylindrical power of ≥0.50 diopter cylinder in one or both eyes was considered astigmatism(Sume & Seyoum, 2022). Every kind of refractive defect can be treated in a variety of ways. 1. Correction of the spectacles. Glasses are an easy way to correct refractive defect. 2. Contact lenses. Contact lenses can also be used to directly correct refractive defect on the surface of the eyes. 3. Surgery. Refractive faults can be fixed with a variety of surgical techniques. The cost of corrective lenses and the inaccessibility of refractive services in remote areas are two major reasons why these refractive errors go uncorrected. Another is illiteracy, which causes students to pay little attention to their health problems, particularly those related to their vision. They might not be able to visit the hospital for other reasons. Other factors include student's concerns about their appearance, such as the fact that their eyes appear so prominent in high-powered prescription glasses, causing the bull's eye effect, a six-beautiful blemish; the difficulty of finding appropriate contact lenses; and the need for greater caution when handling contact lenses(Feroz et al., 2021).

Due to its widespread occurrence and long-lasting effects, reducing visual issues brought on by incorrect refractive errors is a crucial global health objective. Uncorrected refractive defects can lead to a number of issues, including subpar academic results, financial difficulties, decreased productivity, and a lower standard of living. One of the most prevalent causes of impaired vision worldwide is refractive errors. Students are not a limitation to the fact that refractive error is regarded as the second leading cause of curable blindness and visual impairment worldwide (Olatunji et al., 2019).

Uncorrected refractive defects is present in 10.2% of people. There are an estimated 36 million blind persons, 188.5 million with mild vision impairment, and 216 million with moderate to severe visual impairment in the world. One of the main causes of vision impairment is uncorrected refractive errors. The most prevalent causes of vision impairment, according to the WHO, are glaucoma (2%) and cataracts (33%), followed by uncorrected refractive errors (43%). Eighty percent of eyesight loss is thought to be curable or avoidable(Aljaberi et al., 2025).

The impact and incidences of both corrected and uncorrected refracted errors on their quality of life or on students in particular cities with a corrected refractive error have been the subject of numerous empirical studies. According to the World Health Organization's evaluation, over 285 million people have visual problems, including low vision and blindness(S. A. Shah et al., 2025). According to numerous community-based research, the prevalence of undetected or untreated refractive defects in adversarial nations is 22.3% in China, 17.3% in Singapore, 15.8% in Chile, 10.2% in Australia, 17.1% in Malaysia, 10.2% in Bangladesh, and so forth. However, a particular school-based study that examined students in Rawalpindi between the ages of 5 and 16 found an incidence of 3.35%. Numerous studies conclude that the sole cause of refractive problems is visits to eye care specialist. A certain percentage of Pakistani schoolchildren with refractive problems are supported by recent studies. Research conducted in Bengaluru, India, found a prevalence of 10%, while a similar study conducted in Lahore, Pakistan, found a prevalence of 19.8% and in southern Punjab, 17.24%. In contrast, a faith-based madrassa in Haripur has a high rate of refractive problems roughly 41%. Additionally, a study conducted in Nigeria found that academic performance was significantly impacted by vision (Latif et al., 2022).12

Research conducted in china, Nigeria, and Lahore demonstrated that students academic performance improved following the use of eyeglasses for refractive error correction. However, research from Singapore, China and Lisbon has demonstrated that there is no substantial correlation between pupil's academic achievement and their refractive error status. These conflicting findings call for more research on how eyesight affects student's academic achievement. The estimated prevalence of refractive error in school-aged children in Indonesia is between 15.9% and 18.39%, which is significantly higher than the 4.9% incidence in children in South East Asia. Children in Indonesia also have a comparatively high rate of uncorrected refractive error. The incidence was found to be 12.1% in Bandung and 12.3% in Yogyakarta City(Syauqie, 2023). A lack of thorough knowledge and screening programs for probable blindness among this particular student group in Pakistan appears to exist, despite a few studies on the incidence of refractive errors and the risk factors linked with them. This disparity highlights the need for more studies and treatments to address refractive problems and promote eye health among madrassa students, especially with regard to early identification and preventative measures. Additionally, research have shown that refractive problems are the most frequent reason for visiting an ophthalmologist or other eye care specialist. However, surveys from nations where routine screening and correctional services are readily available or free of cost demonstrate that cultural disincentives also contribute to low compliance. One of the study shows only school screening programs that ensure inclusive education and overall development by facilitating early identification, diagnosis, refractive error repair, glasses provision, and low vision assistance. Schools can identify possible problem areas, such as academic and health issues, by screening for refractive defects(Zahra et al., 2020). Student's involvement and performance might be impacted by undiagnosed eyesight difficulties, which can also result in behavioral and academic problems. The vision 2020 worldwide movement to eliminate preventable blindness recommends that national eye programs prioritize providing spectacles to across all students with significant Refractive errors and testing visual acuity in school health programs(A. Shah & Khan, 2025). For instance, the incidence of refractive errors in educational institutions differs depending on the region and background. Assessing the effect regarding uncorrected refractive error on academic performance in students is a crucial topic to research for all students, including those in schools at the metric level, colleges, and universities. Metropolitan areas are well-known cultural hubs with a variety of educational establishments, such as colleges, universities, and schools. Both the private and public sectors coexist and provide accessible educational opportunities. This study examined how all students felt about the importance of eye health and how uncorrected refractive errors affected their educational achievement, participation in class activities, confidence, self-esteem, and delayed diagnosis, which resulted in low vision.

Due to a lack of knowledge, resources, or awareness about eye health, students fell behind in their academic achievement, and many of them even left their institutions (Syauqie, 2023). Individuals who suffer from visual impairment due to uncorrected refractive errors may experience both short-term and long-term effects, including decreased possibilities for education and employment, decreased financial benefit for individuals, families, and society, and a lower quality of life(F. Abdullah et al., 2013). The economy of society, as well as an individual's education, personal development, and career opportunities, are all adversely affected by refractive defects. Consequently, the need for effective screening programs to detect individuals with refractive errors has increased recently. To stop visual impairment brought on by refractive errors, the World Health Organization was launched the global initiative visual 2020, also known as "Right to Sight." One of its strategies is to include a primary visual acuity assessment in school health programs and supply spectacles to children with significant refractive issues. One simple and reasonably priced method to aid with

vision development is to wear appropriate eyewear. It is evaluated that other studies only worked on one specific area, age limitation of 5-15 year school students only there was no studies on overall impact of uncorrected refractive errors on academic performance among students of schools up to metric level, colleges and universities from different areas at the same time(Sume & Seyoum, 2022).

The purpose of this study is to investigate how uncorrected refractive defects affect students' academic performance. Additionally, to evaluate the association between visual state and educational outcomes such as grades, activities in class or involvement in it, and distance reading efficiency in order to determine how uncorrected refractive defects affect students' academic performance. Correcting refractive errors and managing it by arranging free eye camps to assess primary eye health, Awareness sessions on eye care about annually eye screening from near eye professionals, educate them about 20-20 rule eye exercise in which if a student spent almost 25-30 minutes on near working like using smartphone, tablets,laptop,computer etc. after 25 minutes they have to look far for approximately 20 feet away for 20 seconds, one elbow length from reading material , moreover, eyes refractive state by treating its power can help in the improvement of academic scores and comparison of overall good quality education in all students including school students up to matric level, college students, and university students because uncorrected refractive errors can have a negative impact on academic performance and in learning particularly in all age groups. By promptly identifying and correcting these errors, student's potential throughout their formative years can be enhanced.

OBJECTIVES

Determine the impact of uncorrected refractive errors on the academic performance of students.

Evaluate the awareness level of students, parents, and teachers regarding refractive errors and their impact on learning.

Assess the association between uncorrected refractive errors and students' academic performance (grades, reading ability, classroom participation).

Compare the academic performance of students with corrected and uncorrected refractive errors.

Identify the most common types of refractive errors (myopia, hypermetropia, astigmatism) among affected students

LITERATURE REVIEW

Uncorrected Refractive Errors (URE): Prevalence and Educational Significance

Uncorrected Refractive Errors (UREs) represent one of the most preventable yet highly consequential visual impairments affecting children and adolescents worldwide. Research consistently shows that unidentified refractive errors impose substantial barriers to students' visual efficiency, academic engagement, and overall developmental outcomes. This issue is particularly severe in Pakistan, where school health screening remains inconsistent and largely dependent on socioeconomic conditions(Aljaberi et al., 2025).

Multiple large-scale studies conducted across Pakistan underscore the severity of the problem. Examined 2,000 high-school students in Lahore and reported a significant refractive error prevalence of 20.6%, with myopia recorded as the most common type. Notably, the prevalence was higher in public schools compared to private institutions, suggesting disparities in access to timely vision care. Similar trends were noted in Faisalabad, where Iqbal et al. (2020) found a 51.5% prevalence of myopia among school-going children substantially higher than hypermetropia or astigmatism highlighting the growing public health burden associated with urban academic pressures and reduced outdoor activities (Latif et al., 2022).

These findings are not isolated to early schooling years. Reported that almost 30% of

university students in Rahim Yar Khan suffered from refractive errors, indicating that the problem often persists into higher education due to a lack of early detection and intervention. Such persistent visual impairment carries profound implications for learning trajectories and academic continuity (Muhammad Arslan, 2024).

International evidence offers a broader comparative perspective. Large-scale screening studies in India and Australia show prevalence rates ranging from 6.7% to 35%, reflecting varying levels of access, awareness, and school-based screening infrastructure. Despite these differences, a consistent pattern emerges: URE affects a substantial minority of the student population across diverse socioeconomic contexts, reinforcing its global educational relevance.(Naseem et al., 2022)

Millions of school-age children worldwide suffer from visual impairment brought on by uncorrected refractive errors, which is also one of the main causes of curable blindness. The goal of the World Health Organization's "Vision 2020" campaign is to eradicate preventable impairment by means of early identification. A tried-and-true technique for this is school based visual screening, yet in places like Kohat, Pakistan, such programs are frequently absent. In order to ascertain the prevalence of refractive errors and visual impairment, 1644 kids between the age of 5 and 15 were evaluated throughout May and June 2015 at a Government School in Kohat. With a prevalence of 8.2%, the results showed that refractive errors which include myopia, hypermetropia, astigmatism, were the most frequent cause of decreased vision. In order to prevent long term effects like amblyopia, the study also found a high percentage of newly discovered cases, highlighting the vital need for organized, school based eye health programs and health programs and health education in the area(*Screening for Refractive Errors and Visual Impairment in School Childrens of Kohat*, 2015).

917 persons aged 30 and older participated in a cross-sectional study to determine the prevalence of uncorrected refractive errors in Pawakah, a rural settlement in Khyber Pakhtunkhwa. The results showed that uncorrected refractive errors were present in 21.7% (95% cl 19.4-24.2%) of the population, with hypermetropia being the most common type, followed by myopia and astigmatism. Notably, visually debilitating impairment (visual acuity <6/18) was present in 6.2% of the population, or 28.64% of those with refractive problems. The study found that the prevalence of myopia was significantly higher in men (9.18%) than in women (3.61%) (p=0.02), but women were more likely to have hypermetropia and astigmatism. Age-related research showed that the prevalence of all refractive errors increased with age, with astigmatism peaking at 61-70 years old (8.75%) and hypermetropia rising the 51-60 year old age group (25.16%). The survey also showed that although 57.5% of people had presbyopia, only 17% of them wore glasses, mostly because of financial limitations. This suggests that rural Pakistani populations may have different patterns of refractive error influenced by factors like educational status, occupational demands, and methodological approaches like manual retinoscopy instead of auto-refractometer. These findings contrast with studies from urban Asian populations where myopia usually predominates(A. S. Abdullah et al., 2015).

Refractive error prevalence, especially in adolescent populations. According to studies, a complex interaction of genetic, environmental, and demographic factors such as changes in lifestyle and an increase in near work activities influences the occurrence and kind of ametropia. According to a 2013 study, the prevalence of myopia in East Asian teenagers varied from 52.5% to 59.1% which is significantly higher than the 8.6% to 17.7% seen in their European counterparts. This study highlights a notably high burden in Asia. This tendency is also supported by data from South Korea and Singapore, where myopia rates in particular age groups have been reported to be as high as 96.5% and 63.4%, respectively. Astigmatism prevalence rates vary greatly, ranging from 14% in China to as low as 3.1% in South Africa, highlighting the influence of ethnic and regional diversity, even though myopia is

frequently the most common error. For example, a research conducted in Yemen found that hyperopia was the most common error, at 53.3%. There is a need for region-specific study because of this worldwide trend as well as evidence showing an increase in eye illnesses in Pakistan(Rahim et al., 2024).

Access to Eye Care: Systemic Barriers and Social Determinants

Despite the treatability of refractive errors, many students remain undiagnosed due to structural, cultural, and informational barriers. Limited access to routine eye examinations, low parental awareness, and the absence of mandatory school screening programs contribute significantly to the high incidence of UREs. The situation is particularly challenging in Pakistan, where reliance on informal health practices, low literacy levels, and limited school-based health infrastructure impede early detection(Zahra et al., 2020).

Studies also emphasize the crucial role of teachers and parents in identifying visual problems. Yet, evidence shows that both groups often overlook early symptoms, especially in environments like madrassas, where reading posture and study habits further exacerbate visual strain. highlighted how students' visual difficulties were frequently dismissed or unnoticed, resulting in changes in posture, increased reading distance, and progressive visual decline (Shahid et al., 2023).

Similarly, qualitative evidence from based on interviews with teachers revealed that many children who required spectacles either did not receive them or failed to use them consistently(Sume & Seyoum, 2022). Even among those prescribed corrective lenses, compliance varied considerably due to lack of follow-up, social stigma, and limited parental supervision. These systemic failures not only delay treatment but also amplify the academic and psychosocial consequences of URE (A. Shah & Khan, 2025).

Taken together, the literature indicates that URE is not solely a medical condition but a socially patterned phenomenon influenced by the broader determinants of health namely socioeconomic status, parental education, and institutional responsiveness(R. S. Khan et al., 2023).

Worldwide, refractive errors are a major public health concern. If left untreated, they can have both short-term and long-term effects, such as less prospects for education and employment, financial losses, and a lower quality of life. Uncorrected refractive problems are caused by a number of issues, such as cultural hurdles to compliance, restricted access to refractive treatments, unaffordable corrective lenses, and a lack of awareness at the individual and community levels. Even in affluent societies with easily available screening procedures, children's refractive defects frequently go unnoticed or uncorrected. There is still a dearth of trustworthy epidemiological data on refractive errors in Saudi Arabian primary school students, and the prevalence rates that have been reported vary widely due to methodological variations, ranging from 10.7% among preschoolers in Jeddah to 23% in the high –altitude city of Abha. In the past, the Saudi Ministry of Education's school health services have not had sufficient facilities for eyesight screening. The goal of the current study was to determine the prevalence and pattern of refractive errors among primary school students aged 6 to 14 in Al Hassa, Eastern province, Saudi Arabia, in response to WHO's global initiative "Vision 2020: The Right to Sight," which advocates for yearly eye exams for all school-aged children. According to the study, myopia accounted for 65.7% of all refractive errors, while the overall prevalence of refractive errors among the 2002 youngsters analyzed was 13.7%. Refractive errors were more common in female students than in male students (58.8% vs 41.2%), and there were notable correlations with age, indicating a rising tendency of myopia in older children (12-14 years). Geographic differences were also noticeable, with urban dwellers exhibiting greater frequencies of hypermetropia and astigmatism and rural females exhibiting higher rates of myopia(F. Abdullah et al., 2013).

Impact on Classroom Engagement and Learning Processes

The link between URE and classroom performance is both physiological and psychological. Reduced visual clarity diminishes a student's ability to read textbooks, follow classroom instruction, and participate in visually demanding tasks. The cumulative effect results in disengagement, diminished concentration, and increasing frustration(I. K. Khan, 2023).

Empirical evidence illustrates this relationship clearly. Documented the strong association between refractive errors and asthenopia symptoms such as headaches, eyestrain, hazy vision, and difficulties in near work particularly among students engaged in intensive reading activities. Such symptoms restrict academic engagement and reduce participation, especially in subjects requiring precise visual discrimination like mathematics or science (Naseem et al., 2022).

Due to high prevalence and huge social and economic implications, uncorrected refractive error (URE) is a major global public health concern. Although its effects are acknowledged globally, this study emphasizes its special significance in Nigeria, where 9.7% of elementary kids in Sokoto metropolis had URE. The 7.3% prevalence utilized for the study's sample size calculation and research in other parts of Nigeria and surrounding West Africa countries is one example of a statistic that is consistent with findings from other regions. Crucially, the study highlights a significant gap in public health intervention because most students, particularly those with URE, had never had an eye exam before. It appears that required visual examination is not yet a typical part of school visual examination is not yet a typical part of school health services in the region, as this absence of routine screening is in line with reports from other West African countries. Since the results of the study show a strong correlation between URE and lower academic achievement, supporting the long-held belief that a sizable amount of classroom instruction is visually dependent, the direct result of this undiagnosed condition is a detrimental effect on education(Olatunji et al., 2019).

Beyond physical discomfort, uncorrected vision problems influence emotional well-being and social interactions. Studies show that children with URE are more likely to feel embarrassed, avoid participation, or develop anxiety due to repeated academic mistakes or misreading tasks.Nida Feroz's work further demonstrates that students with URE score significantly lower on quality-of-life measures, including emotional stability, social functioning, and task performance. These findings suggest that vision impairment has multidimensional consequences that extend far beyond the physical symptom of blurred vision(Nazar et al., 2025).

Academic Performance: Evidence of Causality and Developmental Impact

The cumulative outcome of poor access, reduced engagement, and physiological discomfort is manifest in declining academic performance. Among the strongest evidence in the literature is intervention study, which reported statistically significant improvements in students' academic scores post-correction of refractive errors. This causal relationship is reinforced by teacher-reported improvements in attention, behavior, and class participation after students began using spectacles regularly (Syauqie, 2023).

Additional evidence offers a nuanced perspective by showing that while hyperopia is associated with lower academic scores in early grades, myopia tends to correlate with higher performance in older students preparing for board examinations. This pattern aligns with global findings suggesting that academically intensive routines may contribute to the development of myopia, creating a complex bidirectional relationship between academic engagement and visual health (Zahra et al., 2020).

International studies, also demonstrate that spectacle correction significantly improves functional utility and quality of academic engagement. Together, these studies highlight the strong evidence base supporting school-based interventions and public health strategies to mitigate the educational impact of URE (Aljaberi et al., 2025).

Prevalence of refractive error in school-age children with headache and eye strain complaints, ages 5 to 15. The majority (79.1%) of the 220 participants in a hospital – based cross-sectional study at Al Baqi Trust Eye Hospital had a refractive error diagnosis, with myopia accounting for the most prevalent kind (36.4%), followed by hyperopia (21.8%) and astigmatism (20.9%). given that headache and eyestrain were the most common complaints among 51.8% and 48.2% of patients, respectively, the study shows a robust correlation between these visual symptoms and uncorrected refractive defects. Additionally, there was variation in the degree of refractive error, with a significant percentage of children exhibiting mild to moderate visual acuity impairment. These results are consistent with earlier studies, highlighting the importance of routine vision screening in school-aged populations to enable early detection and treatment. Headache and eye strain are important markers of underlying refractive problems in this age group(Bilal & Words, 2022).

Uncorrected refractive error, especially when it arise in childhood, is a major cause of blindness and visual impairment worldwide. Myopia is a disorder that frequently starts in school, and its incidence rises from less than 2% in children under the age of eight to 20% by the age of fifteen. Risk factors for myopia include family history and extended near employment. Even while the majority of refractive defects can be corrected early on with glasses, contact lenses, or surgery, if they are not treated in childhood, amblyopia can cause lifelong blindness. Sub-Saharan Africa, including Ethiopia, is particularly affected by this issue, which is made worse by low student knowledge, the disease's gradual and painless nature, and the restricted availability and accessibility of eye care treatments. Furthermore, the research vacuum this study sought to fill was caused by a lack of thorough information, which makes it difficult for policymakers to put effective preventive and remedial measures into place(Sewunet et al., 2014).

One of the main cause of visual impairment (VI) in school-age children is refractive error, which can have a detrimental effect on social and academic development as well as result in lifelong visual impairments if untreated. Twenty percent of the 680 children evaluated in the Baramulla district of Kashmir had uncorrected refractive problems, according to a cross-sectional research. At 57.4%, myopia was the most common kind of vision impairment, followed by hypermetropia (36.1%) and astigmatism (5.3%). These results are consistent with the larger picture of childhood blindness in India, where untreated refractive defects continue to pose a serious threat to public health. Regional differences in refractive error patterns are highlighted by the study's myopia prevalence, which is comparable to the 61% observed in Bengaluru but noticeably greater than the 31.9% reported in East Sikkim. The authors emphasize the importance of routine school-based vision examinations as a key element of health programs to ensure early detection and treatment, attributing these problems to elements such genetic susceptibility, malnutrition, and increasing screen time(Hassan et al., 2023).

Nearsightedness, also known as myopia, is a rising public health issue, especially in school-age children. Environmental variables including less outdoor time and prolonged near employment, as well as genetic predispositions, are associated to the development of myopia. This is particularly common in the modern period, when electronic screens are being used more and more for pleasure and instruction. Global prevalence estimates vary, studies from China and Singapore show that myopia can afflict more than half of children, whereas studies from Malaysia and Iran have shown lower rates of refractive errors (3.5% to 7.7%). The presented study supports findings from Nepal and other earlier studies that consistently demonstrate that schoolchildren in urban areas are more likely than those in rural areas to have myopia. This discrepancy is frequently ascribed to lifestyle variations, such as spending more time indoors reading and using electronics and less time outdoors. Additionally, this study indicates that the prevalence of myopia tends to rise with grade level and is frequently

higher among female students, perhaps as a result of spending more time on academic activities close to the workplace(Abbas et al., 2022).

Rationale

One of the most prevalent yet readily curable causes of visual impairment in school-age children is uncorrected refractive error. Many children, especially in underdeveloped nations, go undiagnosed or untreated despite the fact that it can be easily corrected with glasses or contact lenses. Since many classroom tasks, like writing, using digital devices, and reading from the board, require good vision, vision is essential to learning. Uncorrected refractive defects can make it difficult for kids to see clearly, which makes it difficult for them to comprehend courses and successfully complete academic assignments.

A student's academic performance and entire educational experience can be greatly impacted by poor vision, which goes beyond simple visual discomfort. Students who have uncorrected refractive problems frequently suffer from headaches, eye strain, diminished motivation to participate in class activities, and impaired concentration. As a result, their academic performance may deteriorate owing to an avoidable visual impairment rather than a lack of brains or effort. Over time, this may also have a detrimental effect on their self-esteem and participation in class.

Even though a number of studies have demonstrated the connection between vision issues and learning challenges, there is still a lack of awareness and inadequate screening programs in many places, especially in Pakistan. The symptoms of refractive defects may go unnoticed by many kids and even parents, delaying diagnosis and treatment. Research that explicitly looks at how uncorrected refractive defects impact pupils' academic performance in the local context is therefore crucial.

This study is significant because it attempts to draw attention to the scope of the issue and stress the importance of early refractive defect detection and prompt repair. The research can assist educators, medical experts, and legislators in developing measures like school-based vision screening programs by determining the influence on academic outcomes. In the end, by addressing an avoidable cause of academic difficulty, this project will improve students' academic performance and quality of life.

Operational Definition

Emmetropia:

When a healthy, normal eye has emmetropia, parallel light rays from infinity focus precisely on the retina without the need for accommodation or corrective lenses.

Ametropia:

When accommodation is at rest, parallel light rays from infinity do not focus on the retina due to a refractive condition called ametropia.

Myopia:

When accommodation is at rest, parallel light rays from infinity focus in front of retina, causing myopia, a refractive error.

Hyperopia:

When accommodation is relaxed, parallel light rays from infinity focus behind the retina in hyperopia, a refractive error.

Astigmatism:

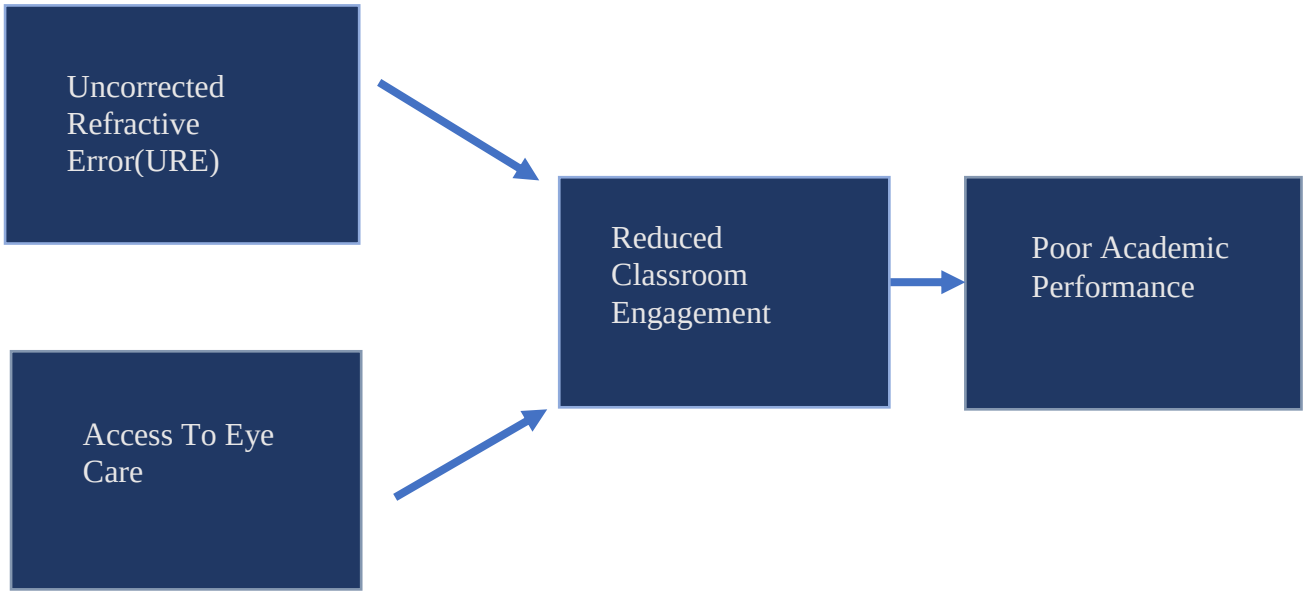
Astigmatism is a refractive error in which the unequal curvature of the cornea or lens causes parallel light rays to focus at two focal lines rather than at a single point on the retina.

Corrected refractive error:
When optical correction is applied to a refractive condition (myopia, hyperopia, astigmatism), light rays focus precisely on the retina, allowing for clear vision. This condition is known as corrected refractive error.

Uncorrected refractive error:
Uncorrected refractive error refers to a condition where a person has a refractive condition (myopia, hyperopia, and astigmatism), but is not using any optical correction such as glasses, contact lens or surgery.

Hypothesis
H1: Academic performance and Uncorrected Refractive Error (URE) are significantly correlated.
H2: Academic performance and access to eye care services are significantly correlated.
H3: There is a significant relationship between Uncorrected Refractive Error (URE) and Reduced Classroom Engagement & Learning.
H4: There is a significant relationship between Reduced Classroom Engagement & Learning and Academic Performance.
H5: Academic performance and uncorrected refractive error (URE) are mediated by reduced classroom engagement and learning.
H6: Access to Eye Care Services has a significant relationship with the presence of Uncorrected Refractive Error (URE). Students with better access to eye care are less likely to have a refractive error that remains uncorrected.

Model:



METHODOLOGY
Research Design: The cross-sectional analytical research design was used in this study. The approach of the study is quantitative to investigate the phenomenon. The research was conducted from multiple educational institutions. A survey technique was selected to collect data using a questionnaire. This method was chosen because it allows data collection from a large number of participants in a short period of time.

Clinical Settings: Students from schools (Matric level), colleges, and universities of Rahim Yar Khan were randomly selected to participate in this study.

Sample Size: A total sample of 300 respondents was selected using a convenience sampling technique. The majority of participants were females, while males were in the minority.

Sampling Technique: The sample was considered representative of a large population. A convenience sampling technique was used in this study because it was the most suitable method for collecting data within limited time and resources.

Duration of Study: The duration of this study was four months, from January to April. All stages of the study, including topic selection, data collection, data analysis, and final report compilation, were completed within this period. This time frame was considered sufficient to achieve the study objectives and ensure reliable and accurate results.

Selection Criteria

Inclusion Criteria: This study will encompass students aged ≤16 to 25 or above from different regions and various educational levels, including schools, colleges, and universities. Students will be selected to ensure diversity in age, gender, and academic background. Prior to participation, informed consent will be obtained from both students and their parents or guardians. They will be clearly informed about the purpose of the study, procedures involved, and their right to withdraw at any time without any consequences. Confidentiality and privacy of all participants will be strictly maintained throughout the study.

Exclusion Criteria: Students aged ≤12–13 years, as well as those with any ocular diseases, ocular infections, or systemic illnesses, will be excluded from this study. In addition, students who are already using corrective eyewear that fully corrects their refractive error will also not be eligible for participation. These exclusion criteria are applied to ensure the accuracy and reliability of the study results and to avoid any confounding factors that may affect the assessment of uncorrected refractive error and academic performance.

Ethical Consideration

The research will be conducted in accordance with the guidelines established by Superior University Lahore's ethics committee, and the participants' rights will be upheld.

The patient gave both written and verbal consent regarding the study's goals and design, assuming that they had enough time to weigh all of their options. This ensured that the volunteer subject would comprehend the information and continued giving information, exchange information, and ask questions.

Every participant will be required to provide written informed consent.

All data collecting and information will be kept private.

Throughout the study, participants will maintain their anonymity.

The participants will be made aware that there are no dangers or drawbacks to the study's methodology.

Participants will also let them know that participants are free to leave the study at any point.

This research will not present any hazards.

We'll take all reasonable steps to safeguard your privacy. No publication arising from this study will disclose you identify.

It is entirely voluntary for you to take part in this study. You have the option to decline participation and to change your mind at any moment. If you choose not to participate in this study or to quit from it, you will not be penalized in any way.

Data Collection Procedure

The data collection process was conducted in a systematic manner to ensure accuracy and reliability. First, permission was obtained from the selected schools, colleges, and institutions. Students were then selected according to the inclusion criteria, and informed consent was taken from both students and their parents or guardians. After selection, a structured questionnaire was distributed through Google Forms to collect demographic information, study habits, and related factors such as screen time.

After completing the questionnaire, each student underwent a basic vision assessment using a Snellen chart to identify uncorrected refractive errors. Students who required further evaluation were examined through simple refraction procedures. Academic performance data, including grades and test scores, were collected from official school or college records with permission from the administration.

All collected data were recorded in a spreadsheet linked to Google Forms and later organized for analysis. Strict confidentiality was maintained throughout the process, and participation was voluntary with the right to withdraw at any time.

Data Analysis

The collected data were analyzed using SPSS (Statistical Package for the Social Sciences) version 25. Descriptive statistics were applied to summarize the data, including frequencies, percentages, means, and standard deviations. Cross-tabulation was used to examine the relationship between uncorrected refractive error and academic performance. Appropriate statistical tests such as the chi-square test were applied to determine the association between variables. A p-value of less than 0.05 was considered statistically significant. The results were then presented in the form of tables and charts for clear interpretation

RESULTS

Participant Demographics

A total of **300 responses** were collected from students across different educational levels. Demographic analysis revealed that the majority of participants fell in the **19–21 years age group** (72.7%), followed by those aged 22–24 years (15%) and ≤16–18 years (7%). Regarding gender, **Male** students constituted 53.7% of the sample, while females accounted for 46%. In terms of educational level, **University students** were the most represented group (72.7%), followed by college students (21.3%). Participants were enrolled in diverse fields including BS Optometry, BSCS, DPT, FSc (Pre-Medical and Engineering), BBA, and others. These findings are summarized in

Table 1.

Table 5.1 Participant Demographics (n = 300)

Variable	Category	n	Percentage (%)
Age Group			
	≤16–18 years	21	7.0%
	19–21 years	218	72.7%
	22–24 years	45	15.0%
	25 years or above	16	5.3%
Gender			
	Male	161	53.7%

Variable	Category	n	Percentage (%)
	Female	138	46.0%
	Prefer not to say	1	0.3%
Educational Level			
	School Student (Matric)	18	6.0%
	College Student	64	21.3%
	University Student	218	72.7%

Figure 5.1 Age Group

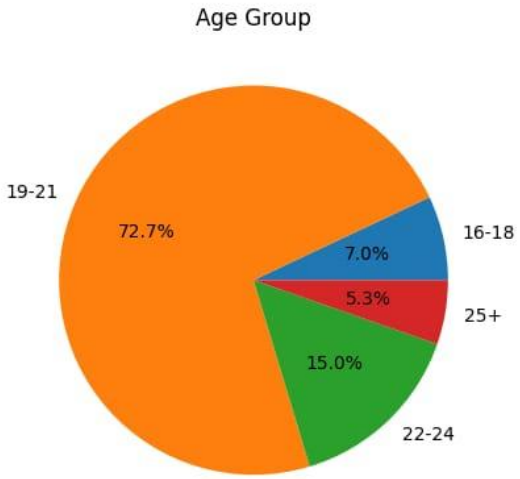
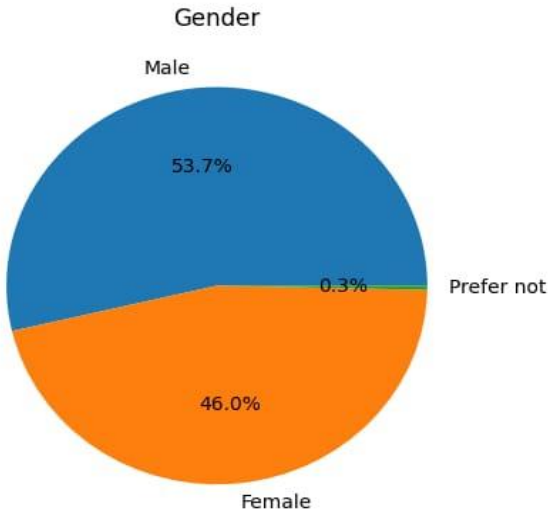


Figure 5



Prevalence of Visual Symptoms

Table 5.2 Visual Symptom Frequency Among Students (n = 300)

Variable	Category	n	Percentage (%)
Difficulty Seeing the Board from Seat			
	Never	22	7.3%
	Occasionally	13	4.3% (combined)
	Sometimes	100	33.3%
	Often	60	20%
	Always	105	35%
Difficulty Reading Near Objects (n = 299)			
	Never	36	12.0%
	Occasionally	13	4.4%
	Sometimes	58	19.4%
	Often	31	10.4%
	Always	161	53.8%
Squinting to See Distant Objects (n = 300)			
	Never	29	9.7%
	Occasionally	10	3.3%
	Sometimes	65	21.7%
	Often	26	8.6%
	Always	170	56.7%

Figure 5.3 Board Difficulty seeing

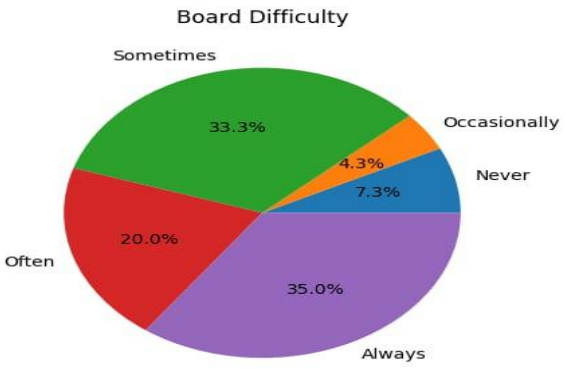
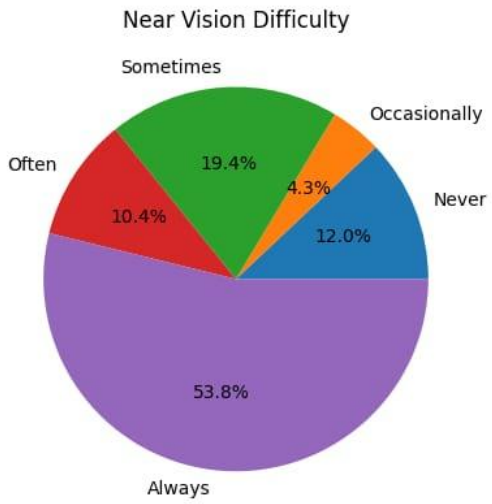


Figure 5.4 Near Vision Difficulty Seeing



Impact on Academic Concentration and Performance

Table 5.3 Academic Performance and Attention Impact (n = 300)

Variable	Category	n	Percentage (%)
Difficulty Paying Attention in Class (n = 298)			
	Never	28	9.4%
	Occasionally	10	3.3%
	Sometimes	30	10.1%
	Often	61	20.3%
	Always	171	57.4%
Missing Important Board Information (n = 299)			
	Never	25	8.4%
	Sometimes	53	17.7%
	Occasionally	26	8.7%
	Often	32	10.6%
	Always	164	54.6%
Self-Rated Overall Academic Performance (n =			

Variable	Category	n	Percentage (%)
299)			
	1 (Very Poor)	33	11.0%
	2	139	46.5%
	3	76	25.4%
	4	45	15.1%
	5 (Excellent)	6	2.0%
Belief that Vision Correction Would Improve Academic Performance (n = 300)			
	1 (Strongly Disagree)	2	0.7%
	2 (Disagree)	5	1.6%
	3 (Neutral)	41	13.7%
	4 (Agree)	130	43.3%
	5 (Strongly Agree)	122	40.7%

Figure 5.6 Missing Board Information

Figure 5.5 Difficulty paying attention in class

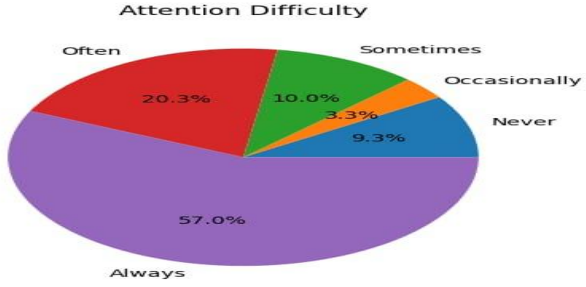
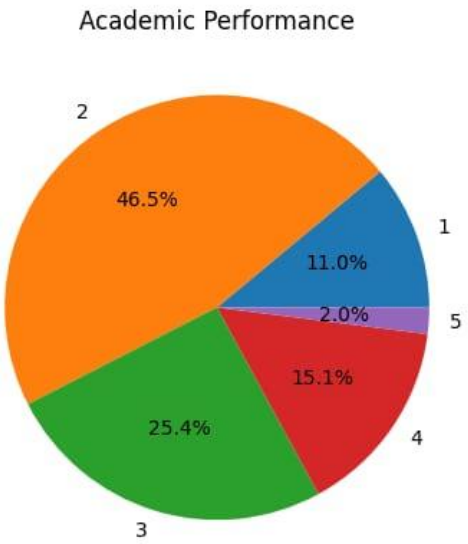
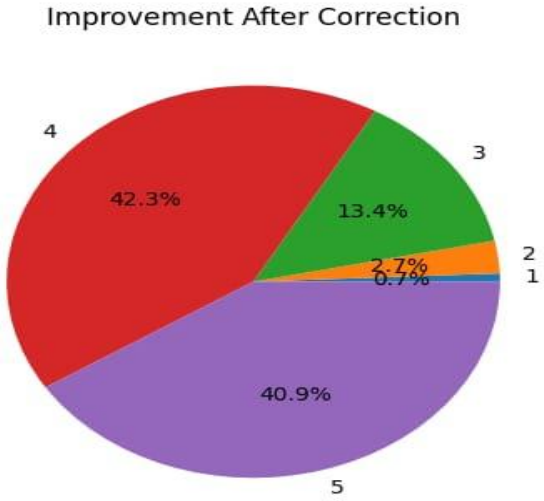


Figure 5.7 Overall Academic Performance

Figure 5.





Eye Strain, Fatigue, and Headache

Table 5.4 Eye Strain and Headache During Academic Tasks (n = 297–296)

Variable	Category	n	Percentage (%)
Headache / Eye Strain During or After Studying (n = 297)			
	Never	26	8.8%
	Occasionally	11	3.7%
	Sometimes	58	19.5%
	Often	38	12.8%
	Always	164	52.2%
Eyes Get Tired			

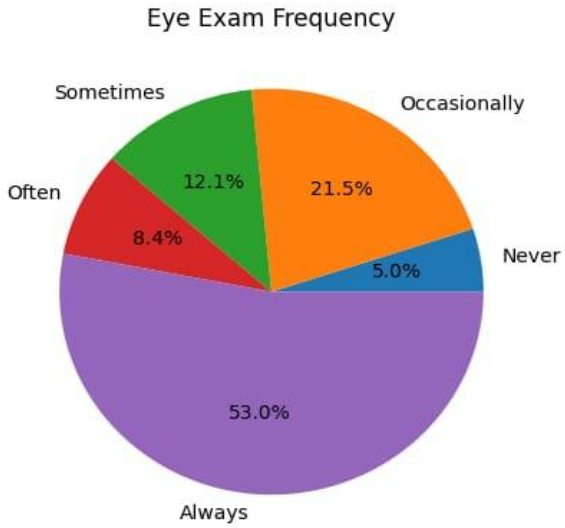
Variable	Category	n	Percentage (%)
Quickly While Studying (n = 296)			
	Never	19	6.4%
	Occasionally	14	4.4%
	Sometimes	67	22.6%
	Often	43	14.5%
	Always	153	51.7%

Eye Examination History

Table 5.5 Eye Examination History (n = 298–299)

Variable	Category	n	Percentage (%)
Have You Had a Complete Eye Exam by an Optometrist? (n = 298)			
	Often	15	5.0%
	Sometimes	64	21.8%
	Rarely	36	12.1%
	Never	25	8.4%
	Always	158	53.0%
When Was Your Last Eye Checkup? (n = 299)			
	Less than 3 months ago	30	10.0%
	Less than 6 months ago	35	11.7%
	6–12 months ago	168	56.2%
	More than 1 year ago	41	13.7%
	Never had an eye checkup	25	**8.4%**

Figure 5.9 Eye Exam Frequency



Awareness of Refractive Errors and Importance of Eye Checkups

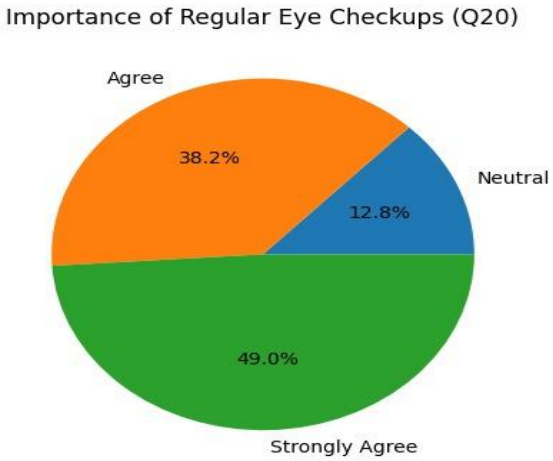
Table 5.6. Student Awareness of Refractive Errors and Eye Care (n = 299–300)

Variable	Category	n	Percentage (%)
Uncorrected Vision Reduces Attention/Focus in Class (n = 299)			
	Strongly Disagree	2	0.6%
	Disagree	5	1.6%
	Neutral	49	16.4%
	Agree	98	32.8%
	Strongly Agree	145	48.5%
Aware That Uncorrected Refractive Errors Affect Academic Performance (n = 299)			
	1 (Strongly Disagree)	2	0.7%

Variable	Category	n	Percentage (%)
	2 (Disagree)	9	3.0%
	3 (Neutral)	40	13.4%
	4 (Agree)	117	39.1%
	5 (Strongly Agree)	131	**43.8%**
Regular Eye Checkups Are Important for Students (n = 300)			
	Strongly Disagree	4	1.3%
	Disagree	8	2.6%
	Neutral	37	12.3%
	Agree	141	47.0%
	Strongly Agree	110	**36.7%**

Figure 5.10 Awareness That Refractive Error Affect Academic Performance

Figure 5.11 Importance of Regular Eye Check



Perceived Improvement After Vision Correction

Table 5.7 Perceived Academic Improvement After Vision Correction (n = 298)

Category	n	Percentage (%)
5(No improvements)	2	0.7%
4	8	2.6%
3	40	13.4%

Category	n	Percentage (%)
2	126	42.2%
1(Significant improvement)	122	40.9%

Figure 5.12 Perceived Improvement After Vision Correction

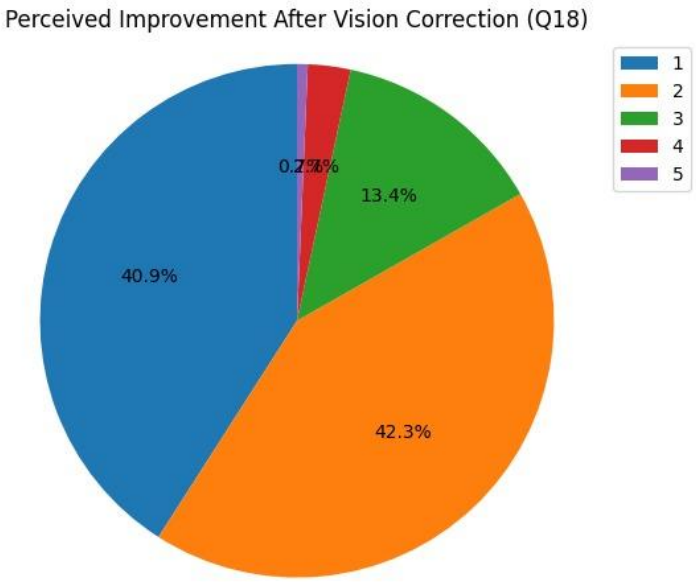


Table 5.8 Association Between Visual problems &Academic Performance

Variable (visual difficulty)	Correlation (r)	p-values	interpretation
Difficulty seeing board	0.283	p<00.01	Significant
Near vision difficulty	0.284	p<0.001	Significant
Squinting (distance vision)	0.277	p<0.001	Significant
Attention difficulty	0.296	p<0.001	Highly significant
Missing board information	0.315	p<0.001	Highly significant

Table 5.9 Mean Academic Performance Based on Visual Difficulty

Variable	Mean Academic Score (±SD)	P-values
Low visual difficulty	3.8 ±0.9	-
Moderate difficulty	3.2 ±1.0	-
High difficulty	2.6 ±1.1	<0.001

Table 5.10 Mediation Path Analysis

Path	r-values	p-values
Visual problems →	0.79	<0.001

Engagement		
Engagement → Academic performance	0.31	<0.001
Visual problems → Academic performance	0.28	<0.001

Table 5.11 Hypothesis Testing

Hypothesis	Statement	Results
H1	URE affects academic performance	Accepted
H2	URE affects classroom engagement	Accepted
H3	Engagement affects performance	Accepted
H4	Eye strain affects performance	Accepted
H5	Awareness affects performance	Accepted
H6	Eye care access affects URE	Accepted

Statistical analysis revealed a significant relationship between uncorrected refractive error indicators and academic performance. Difficulty in seeing the board ($r = 0.283$, $p < 0.001$), near vision problems ($r = 0.284$, $p < 0.001$), and squinting ($r = 0.277$, $p < 0.001$) were all significantly associated with lower academic performance.

Additionally, classroom engagement variables, including difficulty paying attention ($r = 0.296$, $p < 0.001$) and missing important board information ($r = 0.315$, $p < 0.001$), showed strong associations with academic outcomes.

Mediation analysis indicated that reduced classroom engagement partially mediates the relationship between visual problems and academic performance**.**

DISCUSSION

The purpose of this study was to assess how students' academic performance was affected by uncorrected refractive errors (URE). The findings reveal a strong and statistically significant correlation between visual impairment and reduced academic achievement, thereby reinforcing the importance of early detection and correction of refractive errors among students across educational levels. A substantial proportion of participants in this study reported persistent visual complaints. Specifically, 35% of students always experienced difficulty seeing the board from their seat, while 53.8% consistently reported problems with near vision tasks, and 56.7% habitually squinted to perceive distant objects. These figures indicate that uncorrected or insufficiently managed refractive errors are highly prevalent within the studied population, a finding consistent with global patterns. The World Health Organization estimates that uncorrected refractive errors account for 43% of all causes of visual impairment worldwide, making it the leading cause ahead of cataracts (33%) and glaucoma (2%) (WHO, 2020). These statistics situate the current study within a broader public health concern that transcends geographic and demographic boundaries.

Similar patterns of high visual symptom burden have been documented in Pakistan and internationally. Latif et al. (2022) examined 2,000 high-school students in Lahore and documented a refractive error prevalence of 20.6%, with myopia being the most

common type, particularly higher in public schools than in private institutions. Likewise, Iqbal et al. (2020) reported a 51.5% myopia prevalence among school-going children in Faisalabad, attributing this to urban academic pressures and limited outdoor exposure. Internationally, large-scale screening studies in India and Australia have reported prevalence rates ranging from 6.7% to 35%, reflecting the varying levels of access to eye care and school-based screening infrastructure (Sume and Seyoum, 2022). The high symptom frequency found in the current study thus aligns with prior evidence and highlights an unmet need for systematic vision screening programs.By contrast, the Indonesian study by Syauqie and Hastono (2023), conducted among 91 junior high school students in Padang, found that approximately 25.3% of students had uncorrected refractive errors. In that study, the majority of affected students (69.6%) had no prior history of wearing eyeglasses, a finding that mirrors the present study's observation of a gap between visual need and actual correction. However, the prevalence in the current study appears substantially higher based on self-reported visual symptoms, which may reflect the broader age range and educational diversity of the sample, spanning school, college, and university levels.

The results of the current study demonstrate that visual difficulties significantly impair classroom engagement. A striking 57.4% of students reported always experiencing difficulty paying attention in class, and 54.6% indicated that they always missed important information from the board. These findings underscore the critical role that uncorrected refractive errors play not only in diminishing visual clarity but also in undermining the cognitive and attentional demands of academic participation.

The mediation path analysis in this study confirmed that reduced classroom engagement partially mediates the relationship between visual problems and academic performance ($r = 0.79$, $p < 0.001$ for visual problems to engagement; $r = 0.31$, $p < 0.001$ for engagement to academic performance). This mediating pathway is a critical contribution of the present study, as it reveals that the damage to learning is not solely direct but is substantially channeled through disengagement. Students who cannot see clearly tend to disengage from board-based instruction, miss vital academic content, and consequently underperform.

These findings are well-supported by prior literature. Olatunji et al. (2019) conducted a study among elementary school children in the Sokoto metropolis, Nigeria, and demonstrated a strong correlation between URE and lower academic achievement, concluding that a significant amount of classroom instruction is visually dependent. Their study found that 9.7% of elementary students had URE, and importantly, most had never received an eye examination reflecting a systemic failure in routine school health services. Similarly, Shahid et al. (2023) demonstrated robust links between refractive errors and asthenopia symptoms including headaches, eyestrain, and blurred vision that restricted academic engagement, particularly in subjects requiring precise visual discrimination such as mathematics and science. The present study's findings on headaches and eye strain during studying (52.2% always experiencing these symptoms) are entirely consistent with these earlier reports.

In contrast, the study by Syauqie and Hastono (2023) found no significant correlation between uncorrected refractive error and academic performance as measured by report marks ($p = 0.379$), despite students with URE having significantly worse distance visual acuity. Their explanation was instructive: learning activities in Australian classrooms have been shown to demand near work for 54–56% of the time and distance work for only 25–29% of the time (Narayanasamy et al., 2016, as cited in Syauqie and Hastono, 2023). Since myopic students retain good near vision, their academic performance may remain unaffected in traditional grading systems. The current study addresses this limitation by incorporating subjective measures of classroom participation, attention span, and perceived academic performance which are more sensitive indicators of the real-world impact of URE than formal report marks alone.Statistical analysis in the current study revealed significant associations

between all measured visual difficulty indicators and academic performance. Difficulty in seeing the board correlated with academic outcomes ($r = 0.283$, $p < 0.001$), as did near vision difficulty ($r = 0.284$, $p < 0.001$) and squinting for distance vision ($r = 0.277$, $p < 0.001$). Among the classroom engagement variables, attention difficulty showed an even stronger association ($r = 0.296$, $p < 0.001$) and missing board information demonstrated the highest correlation ($r = 0.315$, $p < 0.001$). Furthermore, students with high visual difficulty had a significantly lower mean academic score of 2.6 ± 1.1 compared to those with low visual difficulty (3.8 ± 0.9), with a p-value of less than 0.001.

These findings are consistent with multiple prior investigations. Latif et al. (2022) similarly demonstrated that academic performance among high school students in Lahore improved significantly following correction of refractive errors with eyeglasses. Studies in China and Nigeria further corroborate this, reporting improved academic scores after spectacle provision (Syauqie and Hastono, 2023). Hassan et al. (2023) found that in the Baramulla district of Kashmir, 20% of 680 evaluated children had uncorrected refractive problems, with myopia comprising 57.4% of cases. The authors emphasized that refractive errors left undetected progressively erode academic and social development. In the context of the current study, such findings reinforce the practical urgency of early and systematic screening, given that the population studied spans school, college, and university levels, each with distinct but uniformly vision-dependent academic demands.

Notably, studies from Singapore, Portugal, and Los Angeles as reviewed by Syauqie and Hastono (2023) reported that presenting visual acuity, spherical equivalent power, and corrective lens use had no significant effect on academic school performance as assessed through formal grades. The present study does not necessarily contradict these findings; rather, it extends them by demonstrating that when broader dimensions of academic functioning are assessed including participation, concentration, and perceived performance the impact of URE becomes clearly measurable and highly significant. This distinction between objective grades and functional academic engagement is an important contribution that future research should continue to explore.

The current study found that over half of the student participants (52.2%) always experienced headaches or eye strain during or after studying, and 51.7% reported that their eyes tired quickly while studying. These asthenopia-related complaints are directly linked to the sustained visual effort required of uncorrected refractive errors during near tasks such as reading, writing, and screen use. The 20-20-20 rule looking 20 feet away for 20 seconds every 20 minutes of near work has been advocated as a preventive measure, yet few students appear to practice it consistently.

Bilal et al. (2022) reported that in a hospital-based cross-sectional study at Al Baqi Trust Eye Hospital, 79.1% of children presenting with headache and eye strain complaints were diagnosed with refractive errors, most commonly myopia (36.4%), followed by hyperopia (21.8%) and astigmatism (20.9%). Headache and eyestrain were the most common presenting complaints among 51.8% and 48.2% of patients respectively, consistent with the present study's data. Shahid et al. (2023) further documented that students in madrassa settings who had uncorrected refractive errors scored significantly higher on asthenopia symptom scales, and that these symptoms directly impaired their capacity to sustain studying activities. Taken together, these findings confirm that asthenopia is not merely a physical discomfort but a mechanism through which URE degrades study efficiency and academic stamina.

The current study identified a relatively high level of student awareness about the impact of vision on academic performance: 81.3% agreed or strongly agreed that uncorrected refractive errors affect academic performance, and 83.7% affirmed that regular eye checkups are important. Despite this awareness, a substantial portion of students had not received a recent eye examination 13.7% had their last checkup over

a year ago, and 8.4% had never had an eye checkup at all. This discrepancy between awareness and practice is a critical finding, suggesting that knowledge alone is insufficient to drive behavior change in the absence of accessible, affordable eye care services.

This pattern has been documented extensively in the literature. Syauqie and Hastono (2023) noted that high rates of uncorrected refractive error persist in low-middle-income countries primarily because of the costs and limited availability of refraction and spectacles dispensing services. They reported that 69.6% of students with uncorrected refractive errors in their Indonesian sample had no history of wearing eyeglasses, and cited evidence from China, Bhutan, and India where 53.5%, 80.92%, and 90.8% of school children with URE respectively did not wear spectacles. Naseem et al. (2022) similarly found that socioeconomic constraints, cultural barriers, and limited screening infrastructure in Pakistan create a cycle where students remain visually impaired through no fault of their own understanding but due to systemic failures in health service delivery.

Furthermore, qualitative evidence cited in earlier studies reveals that teachers and parents frequently overlook early visual symptoms in children, particularly in resource-limited settings. Teachers' perceptions of improved attention and behavior following spectacle correction have been documented by Shah and Khan (2025), who found that teacher-reported improvements in class participation were significant after students began using corrective lenses. The current study's Hypothesis 5 that awareness affects academic performance was accepted, indicating that increased awareness among students, when translating to actual eye care utilization, positively influences academic outcomes. Institutional strategies including awareness campaigns, subsidized eye care, and school-based vision screening are therefore not optional but necessary interventions.

A remarkable 83.1% of students in this study believed that vision correction would improve their academic performance, and 40.9% reported experiencing significant improvement after correction. These self-reported data are highly consistent with intervention-based evidence from the literature. Studies conducted in China and Nigeria demonstrated significant improvements in academic scores following spectacle provision (Syauqie and Hastono, 2023). A randomized controlled trial by Ma et al. (2014), as cited in Syauqie and Hastono (2023), showed that providing free eyeglasses in rural China measurably improved children's educational outcomes. Similarly, Akinremi et al. (2021) in Nigeria found that academic performance of primary school children improved significantly following correction of refractive errors with glasses.

The present study's finding that students with corrected refractive errors perceive tangible academic benefits reinforces the causal pathway: visual correction reduces the physiological and cognitive burden of near and distance tasks, enabling fuller engagement with academic material. This aligns with the hypothesis testing results of the current study, in which all six hypotheses including that URE affects academic performance (H1), that URE affects classroom engagement (H2), and that eye care access affects URE (H6) were accepted with statistical significance. The overall model, which posits that URE leads to reduced classroom engagement which in turn produces poor academic performance, and that this is compounded by limited access to eye care services, received comprehensive empirical support.

It is important to acknowledge that the findings of the current study differ from the conclusion of Syauqie and Hastono (2023), who found no significant correlation between uncorrected refractive error and academic performance when measured through formal report marks ($p = 0.379$). This divergence may be attributed to several methodological and contextual differences. First, the Indonesian study used objective report marks as the sole measure of academic performance and focused exclusively on junior high school students aged 12–15 in a single school. The current study

incorporated broader subjective measures including perceived performance, classroom participation, attention span, and reading efficiency and recruited from multiple educational levels, including school (matric), college, and university students. Second, the Indonesian study's small sample of 91 students may have limited its statistical power to detect associations. Third, as Syauqie and Hastono (2023) themselves noted, children with uncorrected myopia may paradoxically perform comparably on formal grades because they spend more time in near activities such as reading, which compensates for their poor distance vision. The current study's multidimensional assessment design, by contrast, captures the full scope of how URE impairs learning processes beyond what formal grades reflect.

CONCLUSION

This study concludes that pupils' academic performance is significantly impacted by uncorrected refractive problems. Students frequently had visual challenges such hazy vision, trouble seeing the board, and near vision issues, which were strongly linked to poorer academic results.

The results of the study show that uncorrected refractive errors negatively impact classroom participation, attention span, and the capacity to understand crucial information during lectures in addition to impairing visual clarity. Together, these elements lead to subpar academic achievement. Reduced classroom participation is a key factor in the relationship between visual issues and academic achievements, as the mediation study further demonstrated.

Students also frequently reported symptoms like headaches, eye strain, and visual tiredness, underscoring the detrimental impact of long-term untreated vision issues on learning capacity and study efficiency. Higher visual difficulty students performed noticeably worse academically, highlighting the significance of quickly resolving these problems.

There is still a gap in the practice of routine eye exams, despite students' relatively high knowledge of the significance of vision care. Many students avoid or put off getting eye exams, which worsens their academic performance and results in long-term uncorrected refractive problems. This emphasizes the need for more affordable and easily accessible eye care services.

There were some discrepancies found when compared with earlier research, including the Indonesian study mentioned. The current study offers compelling evidence for a significant correlation between refractive error and academic achievement, whereas that study found no such relationship. These discrepancies could be explained by differences in demographic characteristics, evaluation techniques, and study design. Significantly, the majority of students in this study thought that getting their vision corrected would help them do better academically, and many of them reported seeing a discernible improvement. This result emphasizes how crucial prompt diagnosis and treatment.

It is advised that educational institutions conduct routine vision screening programs in order to detect students with refractive problems early on. Campaigns to raise awareness among parents and pupils about the value of eye health and routine examinations should also be carried out. Students' scholastic performance and general quality of life can be greatly enhanced by offering inexpensive or free corrective procedures like eyeglasses.

In conclusion, untreated refractive defects pose a serious yet avoidable obstacle to academic achievement. Students' academic performance and long-term development can significantly improve if this problem is addressed by early detection, appropriate management, and easier access to eye care services.

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