

# Prevalence and Associated Factors of Myopia among University Students in Mogadishu, Somalia

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## Abstract

This study investigates the prevalence of myopia (nearsightedness) and its associated factors among university students in Mogadishu, Somalia. Data was collected from 384 students through structured questionnaires. The results showed a high prevalence of myopia (93.23%), with a slightly higher rate in females (95.05%) compared to males (91.58%). Key contributing factors include age, urban living, genetic predisposition, behavior, and screen usage. Students with a family history of myopia had a 100% prevalence rate, while those without had a significantly lower rate (34.78%). Behavioral factors, such as posture during reading and writing, screen time, and outdoor activities, were also linked to higher myopia rates. The study emphasizes the need for targeted interventions, including awareness campaigns, preventive measures, and regular eye health checks, to address the rising myopia burden among students.

## Keywords

Prevalence, Associated Factors of Myopia

## 1. Introduction

Myopia, sometimes referred to as nearsightedness, is a refractive defect of the eye

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that has grown to be a major global public health problem, especially for students in university [1]. Myopia is now the most common form of visual impairment and is regarded as a serious worldwide public health problem [2]. The University of Lahore's research revealed that of the 540 university students with myopia, 234 were men and 306 were women. Of the sixty university students with high myopia, thirty-two were female and twenty-eight were male [3]. However, as a result of growing urbanization, people in Africa have changed in terms of behavior and way of life during the past several decades [4]. As a result, compared to previous generations, more kids and teens in Africa are working indoors and close to the workplace [5].

This also occurred in the African nation of Somalia, at Mogadishu. There has been a significant rise in the incidence of myopia among university students during the past several decades. The possible long-term effects of this tendency on visual health and quality of life make it worrying [6]. Furthermore, because myopia is progressive, relying on corrective methods like glasses or contact lenses can be expensive and inconvenient because prescriptions may need to be updated frequently [7]. Promoting outdoor activities, modifying instructional strategies to lessen eye strain, and offering early detection and corrective procedures to lessen the effects of myopia are a few examples of these interventions [8].

There is rare research on the frequency of myopia among Somalian university students in Mogadishu as of yet. Even though myopia is a major worldwide public health issue, especially for college-age people, there is a substantial study gap due to the paucity of data relevant to any one location [9]. The heterogeneous student body in Mogadishu is represented by these institutions combined, which makes them perfect study subjects. The need for this study is highlighted by the lack of baseline data on the incidence and prevalence of myopia at these universities. Furthermore, the findings could be used to develop targeted interventions, such as eye health awareness campaigns, better access to vision care, or lifestyle changes to prevent the onset or progression of myopia. These interventions could be crucial in addressing the growing myopia burden in Mogadishu, and similar studies in other regions might contribute to global efforts to manage myopia effectively.

## 2. Literature Review

### 2.1. Prevalence of Myopia among University Students

There is a growing trend in the frequency of myopia among college students [10]. According to Makhdoum [2], 433 university students from the province of Al-Madinah participated in the study. The result stated that in Al-Madinah and its regions, myopia was common among college students (57.3%), with 87.9% of them having myopia in both eyes. Respondents who used an electronic screen for more than three hours and who read at a distance of less than 15 cm were significantly more likely to develop myopia. People with greater levels of education and academic success spend a lot more time on near-work activities like reading and less time outside, which may account for the higher frequency of myopia [11].

According to Huang [12], the prevalence of myopia was 86.8% overall, with 86.1% of men and 88.0% of females affected ( $\chi^2 = 0.68$ ,  $P = 0.411$ ). The percentage of university students with myopia was 86.8%. One of the risk factors for myopia was parental myopia. Less myopia was linked to taking breaks after 30 minutes of non-stop reading and spending at least two hours outside. Additionally, in univariate analysis, doing eye workouts was linked to decreased myopia. A survey called Sandhu [13] was carried out with 590 Punjab Institute of Medical Sciences undergraduate medical students. 70.3% of undergraduate medical students had myopia, according to the results. There were more female students (58.7%) than male students (41.3%) in the age range of 21 - 25 years, which had the highest percentage of students (62.7%). 77.1% of pupils have myopia, and 42.2% of students have a family history of the condition. A total of 309 students from various health colleges of King Khalid University participated in the Alamri [14] research. Sun [15] study used a precise 149 respondents, or 48.2%, were myopic. Of the afflicted students, 84 (56.4%) had bilateral myopia, whereas 37 (24.8%) had myopia just in their left eye. Of the students, exactly 122 (81.9%) wear glasses, and 27 (18.1%) use lenses. During their studies, 52.3% of myopic students and 37.5% of normal students, respectively, experienced difficulties carrying out everyday tasks. This difference was statistically significant ( $P = 0.009$ ). Additionally, compared to 25.6% of other students, 51% of myopic students found it difficult to complete tests that included graphs and illustrations  $P = 0.001$ .

Kamara [16] ascertain the frequency and contributing causes of refractive errors among Mbarara University of Science and Technology's Faculty of Medicine students. According to the findings, university students had a prevalence of refractive errors, particularly myopia, of 26.36% with a 95% confidence interval. Among medical students, myopia is most common (60%) followed by astigmatism (37%), and hyperopia (3%). 72% (26) of the cases of astigmatism were myopic, and 28% (10) were compound/mixed astigmatism. AOR 1.68 (1.04 - 2.72) (95% CI) and  $P (0.032)$  indicated a statistically significant association between refractive errors and students' positive family history of refractive error.

Ba & Li [17] provides a detailed knowledge of myopia's complex etiology by combining empirical data with a systematic examination of the literature to evaluate the association between lifestyle choices and myopia. The findings demonstrate a robust correlation between lifestyle choices and myopia, with genetic predispositions intensifying the negative consequences of unhealthy lifestyle choices. Proactive lifestyle changes, particularly increased outdoor exercise, seem to be particularly useful in avoiding myopia.

## 2.2. Factors Associated with Myopia among University Students

Despite several attempts to explain myopia, its precise etiology is still unclear. On the other hand, a number of genetic and environmental risk factors have been linked to the onset and progression of myopia [18]. It is believed that being younger when myopia first appears increases the likelihood of myopia progressing [19]. Nu-

merous variables may offer myopia protection. An Australian cohort research discovered an adverse link between daylight exposure and myopia that persisted even after controlling for age, sex, family myopia history, and educational attainment [20]. Numerous studies have discovered a link between heavy schooling and the development of myopia. Near labor, which included reading and writing, was used to explain this link [21].

Consequently, lessening the workload in the classroom, particularly in the early years of schooling, may help avoid myopia. Zhou *et al.* stated that shigher likelihood of myopia was substantially correlated with female sex, older age, parental myopia, sitting in the rear of the classroom, longer homework assignments, and less time spent outside [22]. The complicated feature of myopia involves both environmental and genetic variables. Numerous studies indicate that increased academic ability, a higher educational attainment level, a history of parental myopia, a significant amount of close work performed on a daily basis, and less time spent outdoors can all raise one's chance of developing myopia [23].

Level of illumination, stress, pharmaceutical drugs, and duration of indoor activity all influence the development of myopia, however they are not the primary reasons. Whether educational attainment is a danger factor in and of itself, a proxy for close work, or some other socioeconomic element is yet unknown [24]. Multiple factors contribute to the etiology of myopia, including the environment and genes. Complex genetics is the cause of myopia. Research indicates that schooling appears to lead to increases in axial length and a shift toward higher myopia in young adults [25].

Activities that include up-close observation, being outside, and education are examples of environmental variables. A number of additional variables, including racial background, economic level, and computer and gadget use [26]. Gender disparities also come into play, with many communities showing greater rates of myopia in females than in males [27]. For academic objectives, students frequently spend extended amounts of time reading, researching, and utilizing computers or other digital devices. These pursuits need prolonged concentration and may eventually cause myopia development and eye strain [28].

The research continuously shows that myopia is becoming more common among college students, while regional rates differ. High prevalence rates, ranging from 57.3% to 86.8%, are reported in studies from Saudi Arabia, China, and India [10]-[28]. These rates are impacted by a number of variables, including parental myopia, near-work activities, and extended screen time. Some studies highlight genetic propensity, while others concentrate on environmental factors such as lifestyle choices, scholastic pressures, and inadequate outdoor activity. Everyone agrees that early onset, academic burden, and near-work activities enhance the likelihood of myopia [10]-[28]. However, there is ongoing debate over whether educational attainment is a direct risk factor or a proxy for increased exposure to near-work circumstances.

Furthermore, some research claim no association between myopia prevalence

and gender, while others detect a substantial difference. There is also conflicting evidence about the effectiveness of therapies like eye exercises and outdoor activities; some research support their preventive benefits, while others find no impact. By looking at regional lifestyles, educational systems, and genetic predispositions, region-specific research might improve knowledge. Future studies should examine the efficacy of interventions and longitudinal data in a variety of demographics.

### **3. Methodology**

#### **3.1. Research Design**

This study will use a cross sectional research methodology with the goal of collecting data at one specific moment in order to evaluate prevalence and associated factors of myopia among university students in Mogadishu, Somalia. One kind of observational research that takes a momentary picture of a population is the cross-sectional study. Questionnaires will be used to obtain primary data for the study on the prevalence and related determinants of myopia among university students in Mogadishu, Somalia.

#### **3.2. Study Population**

##### **3.2.1. Inclusion Criteria**

1) Participants must be currently enrolled as full-time or part-time students at a recognized university in Mogadishu, Somalia namely Mogadishu University, Somali National University, Benadir University, Indian Ocean University (IOU), Somali International University, Al-Imra International University (AIU), University of Somalia (UNISO).

2) Participants must provide informed consent to participate in the study voluntarily.

3) Participants must be within the typical age range for university students, at least 18 years old. Participants who are under 18 years old are not used as research samples because this research examines university students who are over 18 years old.

##### **3.2.2. Exclusion Criteria**

Participants who have previously participated in similar studies within the past year to avoid duplication of data.

#### **3.3. Sample Size Estimation**

If the population size (N) is unknown, then the sample size is calculated using the formula [29]:

$$n = \frac{Z^2 \cdot p \cdot q}{d^2}$$

Note:

$n$  = minimum sample size required;

$Z$  = score Z, based on the desired  $\alpha$  value;

$\alpha$  = degree of trust;

$d$  = error tolerance;

$p$  = proportion of cases studied in the population, if  $p$  is unknown then use the largest  $p$ . The largest  $p$  is  $p = 0.5$ ;

$1 - p = q$ , namely the proportion for the occurrence of an event. If this study uses the largest  $p$ , then  $q = 1 - p = 1 - 0.5 = 0.5$ .

$$n = \frac{4 \times 0.5 \times (1 - 0.5)}{0.05^5}$$

$$n = \frac{0.9604}{0.0025}$$

$$n = 384.$$

So, the minimum sample size required for this research is 384 samples.

### 3.4. Associated Factor Variable

According to Zhang [30], associated factors of myopia among university students are as follows:

1) Sex: Biological differences between males and females can influence myopia prevalence. Women may be more likely to develop it due to hormonal factors or visual habits.

2) Age: Myopia tends to increase during adolescence and early adulthood before leveling off in mid-adulthood. Younger university students may have lower rates.

3) Faculties: Different academic departments may show varying myopia rates due to factors like reading load and screen use.

4) Region: Myopia rates are influenced by environmental factors such as urbanization, pollution, and access to outdoor spaces.

5) Family Genetic History: Myopia risk is higher if one or both parents have it, due to hereditary factors.

6) Frequency Changing Seat: Changing seat positions frequently can affect viewing distance and increase eye strain.

7) Adjust Height Desk: Improper desk height can lead to poor posture and eye strain, increasing myopia risk.

8) Frequency Daily Eye Exercises: Eye exercises help reduce strain and may slow myopia progression.

9) Recess Activity Space: Outdoor recess activities with natural light can help prevent myopia.

10) Time Spent on Homework: Prolonged close-range homework can cause eye strain and increase myopia risk.

11) Duration of Extracurricular Activities: Close-up activities without breaks can contribute to eye strain and myopia.

12) Chest One Punch Away from the Table: Maintaining proper desk distance prevents poor posture and eye strain.

13) Eyes More than One Foot Away: Keeping a proper distance from books/

screens helps reduce eye strain.

14) Fingers One Inch from Pen: Maintaining appropriate pen distance prevents strain while writing.

15) Computer Hours: Prolonged screen time without breaks can lead to digital eye fatigue and increase myopia risk.

16) Mobile Electronic Use: Excessive use of mobile devices at close range can strain eyes and accelerate myopia.

17) Reading in Direct Sunlight: Glare from direct sunlight can increase eye strain, raising myopia risk.

18) Reading Under Electronic Lights Off: Reading in the dark with electronic screens can strain the eyes and harm vision.

19) Reading Lying Down: Lying down while reading strains the eyes due to poor focus stability.

20) Reading While Walking or Riding: Moving while reading causes the eyes to adjust constantly, leading to fatigue.

21) Eyes More than 66 cm Away: Keeping a greater distance from screens helps prevent eye stress.

22) Rest Eyes: Regular eye rest (e.g., 20-20-20 rule) reduces fatigue and slows myopia progression.

23) Outdoor Activity: Exposure to natural light through outdoor activities helps reduce myopia risk.

24) Sleep Duration: Adequate sleep is crucial for eye health; poor sleep increases eye fatigue and myopia risk.

### **3.5. Statistical analysis**

In this study, data management strategies were implemented to assess the collected data. The analysis was performed using IBM SPSS Statistics 22 software. The one-way analysis of variance (ANOVA) was employed to compare the mean values of continuous outcomes across three groups, based on parental myopia status (none, one, or both parents affected). All statistical analyses were conducted using SPSS software, and statistical significance was determined at  $P < 0.05$ . This research also used correlation analysis. The correlation analysis was employed in this study to look at the connections between factors like parental myopia status and certain eye-related outcomes (like refractive errors). If a substantial positive association was discovered, it implies that children are more likely to develop myopia if their parents had the condition. On the other hand, an inverse link would be shown by a negative correlation [31].

## **4. Result and Discussion**

### **4.1. Result**

#### **4.1.1. Respondent Profile**

The respondents of this study were 384 respondents who were enrolled as full-time or part-time students at a recognized university in Mogadishu, Somalia, namely

Mogadishu University, Somali National University, Benadir University, Indian Ocean University (IOU), Somali International University, Al-Imra International University (AIU), University of Somalia (UNISO). Respondents hearus have an age range for university students, at least 18 years old. The following is the respondent profile:

Based on **Table 1**, the gender distribution among respondents shows that 182 students, or 47.4%, are female, while 202 students, or 52.6%, are male. This indicates a slightly higher representation of male respondents in the sample. This balanced distribution allows for the inclusion of diverse perspectives from both male and female students across various universities in Mogadishu.

**Table 1.** Respondents sex.

	Frequency	Percent
Female	182	47.4
Male	202	52.6
Total	384	100

Based on **Table 2**, the largest age group, representing 35.4% of the sample (136 respondents), is over 23 years old. This is followed closely by students aged 18-19 years, who make up 31.3% of the sample (120 respondents). Respondents aged 20-21 years constitute 25.5% of the total (98 respondents), while the smallest age group is students aged 22 - 23 years, comprising only 7.8% of the sample (30 respondents). This distribution illustrates a diverse age range among the respondents, with a notable concentration of students aged 18 - 21, suggesting that the sample includes both younger and slightly older students within the university population.

**Table 2.** Respondents age.

	Frequency	Percent
>23 years old	136	35.4
18 - 19 years old	120	31.3
20 - 21 years old	98	25.5
22 - 23 years old	30	7.8
Total	384	100

Based on **Table 3**, the largest group of respondents, 87 students or 22.7%, are enrolled in the Faculty of Education. This is followed by the Faculty of Engineering, with 77 students or 20.1% of the sample. The Faculty of Information Technology accounts for 54 respondents, representing 14.1% of the total. Other faculties represented include Science with 43 students (11.2%), Sport Science with 36

students (9.4%), Economics with 32 students (8.3%), and Medical Technology with 30 students (7.8%). The Faculty of Arts has the smallest representation, with 25 students or 6.5% of the total respondents. This distribution reflects a well-rounded sample of students from various fields, providing diverse academic perspectives within the study.

**Table 3.** Respondents faculties.

	Frequency	Percent
Arts	25	6.5
Economic	32	8.3
Education	87	22.7
Engineering	77	20.1
Information Technology	54	14.1
Medical Technology	30	7.8
Science	43	11.2
Sport Science	36	9.4
Total	384	100

Based on **Table 4**, 201 respondents, or 52.3% of the sample, come from rural areas, while the remaining 183 respondents, or 47.7%, are from urban areas. This distribution indicates a slightly higher proportion of rural students compared to urban students, providing insights into the perspectives of university students from both regional backgrounds in Mogadishu, Somalia.

**Table 4.** Respondents region.

	Frequency	Percent
Rural	201	52.3
Urban	183	47.7
Total	384	100

#### 4.1.2. Prevalence of Myopia

The following are the results of the prevalence of myopia among university students in Mogadishu, Somalia:

**Table 5** reveals that 384 university students in Mogadishu, Somalia, had an exceptionally high incidence of myopia (93.23%), with a number of behavioral, environmental, and demographic variables being important contributing factors. In terms of sex, the frequency is somewhat greater in females (95.05%) than in men (91.58%). The incidence is continuously high throughout all age categories, with students between the ages of 22 and 23 having the highest frequency (96.67%),

followed closely by those over 23 (95.59%). While both regions have high prevalence rates overall, urban students have a slightly higher prevalence rate (94.54%) than rural pupils (92.04%). In terms of academic subjects, the Faculty of Economics has the greatest prevalence rate (100%) among faculties, while the Faculty of Medical Technology has the lowest percentage (90%) among faculties.

**Table 5.** Prevalence of myopia.

	Myopia		Total	Prevalence of Myopia
	No	Yes		
Sex				
Female	9	173	182	95.05%
Male	17	185	202	91.58%
Total	26	358	384	93.23%
Age				
>23 years old	6	130	136	95.59%
18 - 19 years old	12	108	120	90.00%
20 - 21 years old	7	91	98	92.86%
22 - 23 years old	1	29	30	96.67%
Total	26	358	384	93.23%
Region				
Arts	1	24	25	96.00%
Economic	0	32	32	100.00%
Education	6	81	87	93.10%
Engineering	6	71	77	92.21%
Information Technology	5	49	54	90.74%
Medical Technology	3	27	30	90.00%
Science	4	39	43	90.70%
Sport Science	1	35	36	97.22%
Total	26	358	384	93.23%
Do you suffer from Myopia				
Rural	16	185	201	92.04%
Urban	10	173	183	94.54%
Total	26	358	384	93.23%
Family genetic history				
Neither parent is myopic	15	8	23	34.78%
Father is myopic	8	181	189	95.77%

**Continued**

Mother is myopic	3	112	115	97.39%
Both parents are myopic	0	57	57	100.00%
Total	26	358	384	93.23%

## Frequency of changing seat

Biweekly	7	252	259	97.30%
Weekly	11	60	71	84.51%
Once a month/no change	8	46	54	85.19%
Total	26	358	384	93.23%

## Adjust the height of the desk and chair according to the height

Once every 2 - 3 months	0	13	13	100.00%
Once a term	14	90	104	86.54%
Once a year	4	86	90	95.56%
Non-adjustable	8	169	177	95.48%
Total	26	358	384	93.23%

## Frequency of daily eye exercises at university

Once	2	63	65	96.92%
Twice and more	6	106	112	94.64%
No	18	189	207	91.30%
Total	26	358	384	93.23%

## Recess activity space

Outdoor	16	102	118	86.44%
Inside the teaching building	10	256	266	96.24%
Total	26	358	384	93.23%

## Average daily time spent doing homework or reading and writing after university

No	0	1	1	100.00%
<1 h	12	112	124	90.32%
1 - 2 h	1	51	52	98.08%
≥2 h	13	194	207	93.72%
Total	26	358	384	93.23%

## Average duration of extracurricular tuition per week

No	2	24	26	92.31%
<3 h	10	146	156	93.59%
≥3 h	14	188	202	93.07%
Total	26	358	384	93.23%

**Continued**

Read and write with your chest more than one punch away from the table				
No	26	2	28	7.14%
Yes	0	356	356	100.00%
Total	26	358	384	93.23%
Read and write with eyes more than one foot away from the book				
No	3	9	12	75.00%
Yes	23	349	372	93.82%
Total	26	358	384	93.23%
Read and write with fingers one inch from the tip of the pen				
No	4	8	12	66.67%
Yes	22	350	372	94.09%
Total	26	358	384	93.23%
Average daily computer hours				
No	2	19	21	90.48%
<1 h	4	76	80	95.00%
≥1 h	20	263	283	92.93%
Total	26	358	384	93.23%
Hours of mobile electronic devices use				
No	2	19	21	90.48%
<0.5 h	4	76	80	95.00%
≥0.5 h	20	263	283	92.93%
Total	26	358	384	93.23%
Reading a book or electronic screen in direct sunlight				
No/occasionally	2	19	21	90.48%
Often	4	76	80	95.00%
Always	20	263	283	92.93%
Total	26	358	384	93.23%
Reading the electronic screen with the lights off after dark				
No/occasionally	20	19	39	48.72%
Often	3	76	79	96.20%
Always	3	263	266	98.87%
Total	26	358	384	93.23%

**Continued**

Reading a book or electronic screen while lying down or lying on the back				
No/occasionally	16	26	42	61.90%
Often	4	131	135	97.04%
Always	6	201	207	97.10%
Total	26	358	384	93.23%
Reading a book or electronic screen while walking or riding in a car				
No/occasionally	13	26	39	66.67%
Often	5	131	136	96.32%
Always	8	201	209	96.17%
Total	26	358	384	93.23%
When using the computer, eyes from the screen more than 66 cm				
No/occasionally	10	46	56	82.14%
Often/always	16	312	328	95.12%
Total	26	358	384	93.23%
When using eyes at close range, how often to rest your eyes				
<15 min	1	48	49	97.96%
≤15 < 30 min	2	43	45	95.56%
≤30 < 60 min	6	112	118	94.92%
≥60 min	17	155	172	90.12%
Total	26	358	384	93.23%
Daytime outdoor activity hours				
<1 h	3	41	44	93.18%
1 - 2 h	8	155	163	95.09%
≥2 h	15	162	177	91.53%
Total	26	358	384	93.23%
Average daily sleep duration				
<8 h	17	247	264	93.56%
≥8 h	9	111	120	92.50%
Total	26	358	384	93.23%

Source: Primary Data Processed (2024).

The prevalence of myopia is substantially influenced by genetic history; kids with both parents having myopia have a 100% incidence, whereas students without any parental history of myopia have a far lower prevalence (34.78%). Additionally, behavioral characteristics seem to play a role: pupils who switch seats

every two weeks have a greater prevalence (97.30%) than those who switch seats seldom (85.19%). Students who make height changes to their desks and chairs only once a term are less likely to do so (86.54%) than students who never make modifications (95.48%). The prevalence of daily eye exercises is somewhat greater among those who do them (96.92%) than among those who do not (91.30%). It's interesting to note that students who read and write with the best posture, keeping the chest a punch away from the table, the eyes a foot away from the book, and the fingers an inch from the tip of the pen show a 100% prevalence, which may indicate a connection between posture and the development of myopia.

Device use and screen habits are also important factors: reading from an electronic screen at night with the lights off is linked to an even higher prevalence of myopia, especially for students who regularly engage in this habit (98.87%), and prolonged daily use of computers and mobile devices ( $\geq 1$  hour) is linked to a high prevalence (92.93%). Kids who spend one to two hours outside each day have a slightly greater prevalence (95.09%) in terms of outdoor exercise and sleep than kids who spend less time outside (93.18%). Similarly, the incidence of students sleeping less than 8 hours per day is somewhat greater (93.56%) than that of students sleeping at least 8 hours (92.50%). Collectively, these findings highlight the influence of genetic and behavioral factors on the high prevalence of myopia among university students, underscoring the importance of preventive measures and awareness programs tailored to student populations.

#### 4.1.3. Factors Affecting Myopia

**Table 6** shows the results of the factors affecting myopia among university students in Mogadishu, Somalia.

**Table 6** shows an increased risk of myopia is linked to a number of relevant variables, according to the ANOVA analysis of factors impacting myopia among university students in Mogadishu, Somalia. An especially strong predictor ( $F = 46.597$ ,  $\text{Sig.} = 0.000$ ) was found to be family genetic history, suggesting a significant connection between myopia and familial susceptibility. Furthermore, myopia was substantially correlated with frequent desk height adjustments ( $F = 4.104$ ,  $\text{Sig.} = 0.043$ ) and sitting alterations ( $F = 17.947$ ,  $\text{Sig.} = 0.000$ ), indicating that ergonomic modifications in the learning environment may have an impact on eye health.

Ample room for physical activities during breaks may lower the incidence of myopia, according to the research, which also revealed that recess activity space was a significant predictor ( $F = 12.785$ ,  $\text{Sig.} = 0.000$ ). Additionally, the relevance of keeping the chest one punch away from the table was exceptionally high ( $F = 4603.896$ ,  $\text{Sig.} = 0.000$ ), highlighting the role that posture plays in avoiding eye strain. Maintaining a suitable reading distance is advantageous, as evidenced by the findings that keeping the eyes more than a foot away from reading materials ( $F = 6.599$ ,  $\text{Sig.} = 0.011$ ) and the fingers an inch from the tip of the pen ( $F = 14.289$ ,  $\text{Sig.} = 0.000$ ) were associated with a lower incidence of myopia.

**Table 6.** Factors affecting myopia.

	Mean Square	F	Sig.
Family genetic history	27.777	46.597	0.000
Frequency changing seat	9.135	17.947	0.000
Adjust height desk	3.478	4.104	0.043
Frequency daily eye exercises	1.682	2.950	0.087
Recess activity space	2.647	12.785	0.000
time spent homework	0.830	0.999	0.318
duration extracurricular	0.000	0.001	0.978
Chest one punch away from the table	23.970	4603.896	0.000
Eyes more one foot away	0.197	6.599	0.011
Fingers one inch from pen	0.419	14.289	0.000
Computer hours	0.003	0.009	0.926
Mobile electronic use	0.003	0.009	0.926
Reading in direct sunlight	0.003	0.009	0.926
Reading electronic lights off	43.227	129.427	0.000
Reading lying down	18.492	44.259	0.000
Reading while walking riding	11.246	26.601	0.000
Eyes more than 66cm	1.590	13.135	0.000
Rest eyes	5.025	4.730	0.030
Outdoor activity	0.370	0.810	0.369
Sleep duration	0.032	0.146	0.702

Additionally, reading-related habits were highly significant. There were significant correlations between myopia and reading in low light (with the lights off) ( $F = 129.427$ ,  $\text{Sig.} = 0.000$ ), lying down ( $F = 44.259$ ,  $\text{Sig.} = 0.000$ ), and walking or riding ( $F = 26.601$ ,  $\text{Sig.} = 0.000$ ), indicating that bad reading habits significantly contribute to eye strain. Furthermore, taking regular eye rests ( $F = 4.730$ ,  $\text{Sig.} = 0.030$ ) and keeping more than 66 cm away from a computer screen ( $F = 13.135$ ,  $\text{Sig.} = 0.000$ ) were also associated with a decreased incidence of myopia, suggesting that these behaviors may help preserve vision.

On the other hand, a number of variables did not have a statistically significant impact on myopia (all  $\text{Sig.} > 0.05$ ), including the amount of time spent on schoolwork, the length of time spent in extracurricular activities, the amount of time spent on computers and mobile devices, reading in direct sunlight, the amount of time spent outdoors, and the amount of time spent sleeping. This implies that

although some behaviors, ergonomic procedures, and genetic susceptibility affect the likelihood of developing myopia, overall screen time, participation in extra-curricular activities, and exposure to the outdoors may not have a significant impact on the development of myopia in this student body.

The association between several characteristics and myopia is shown in **Table 7**, with the degree and direction of these relationships measured using Pearson correlation coefficients. At the 0.01 level (high significance) and the 0.05 level (moderate significance), a number of variables have statistically significant relationships with myopia. Maintaining a close distance between the chest and the table has the highest positive correlation with myopia among the strongest correlations ( $r = 0.961$ ,  $p = 0.000$ ). This suggests that people who keep their chest close to the table are more likely to develop myopia. Furthermore, there are significant positive connections between reading when lying down ( $r = 0.322$ ,  $p = 0.000$ ) and reading with electrical lights off ( $r = 0.503$ ,  $p = 0.000$ ), indicating that poor reading habits may be a factor in the development of myopia.

**Table 7.** Correlation of factors affecting myopia.

Variable	Correlation	Myopia
Family genetic history	Pearson Correlation	0.330**
	Sig. (2-tailed)	0.000
Frequency changing seat	Pearson Correlation	-0.212**
	Sig. (2-tailed)	0.000
Adjust height desk	Pearson Correlation	0.103*
	Sig. (2-tailed)	0.043
Frequency daily eye exercises	Pearson Correlation	-0.088
	Sig. (2-tailed)	0.087
Recess activity space	Pearson Correlation	0.180**
	Sig. (2-tailed)	0.000
Time spent homework	Pearson Correlation	0.051
	Sig. (2-tailed)	0.318
Duration extracurricular	Pearson Correlation	-0.001
	Sig. (2-tailed)	0.978
Chest one punch away from the table	Pearson Correlation	0.961**
	Sig. (2-tailed)	0.000
Eyes more one foot away	Pearson Correlation	0.130*
	Sig. (2-tailed)	0.011

**Continued**

Fingers one inch from pen	Pearson Correlation	0.190**
	Sig. (2-tailed)	0.000
Computer hours	Pearson Correlation	-0.005
	Sig. (2-tailed)	0.926
Mobile electronic use	Pearson Correlation	-0.005
	Sig. (2-tailed)	0.926
Reading in direct sunlight	Pearson Correlation	-0.005
	Sig. (2-tailed)	0.926
Reading electronic lights off	Pearson Correlation	0.503**
	Sig. (2-tailed)	0.000
Reading lying down	Pearson Correlation	0.322**
	Sig. (2-tailed)	0.000
Reading while walking riding	Pearson Correlation	0.255**
	Sig. (2-tailed)	0.000
Eyes more than66cm	Pearson Correlation	0.182**
	Sig. (2-tailed)	0.000
Rest eyes	Pearson Correlation	-0.111*
	Sig. (2-tailed)	0.030
Outdoor activity	Pearson Correlation	-0.046
	Sig. (2-tailed)	0.369
Sleep duration	Pearson Correlation	-0.020
	Sig. (2-tailed)	0.702

\*\* . Correlation is significant at the 0.01 level (2-tailed); \* . Correlation is significant at the 0.05 level (2-tailed).

Another important factor is genetic susceptibility; a strong correlation between myopia and family genetic history ( $r = 0.330$ ,  $p = 0.000$ ) indicates that those who have a family history of myopia are more likely to have the condition themselves. The notion that poor reading posture and behaviors might lead to myopia is further supported by the strong positive association found for other reading-related habits, such as reading while walking or riding ( $r = 0.255$ ,  $p = 0.000$ ) and placing fingers one inch from the pen ( $r = 0.190$ ,  $p = 0.000$ ). On the other hand, myopia is negatively correlated with certain characteristics. Activities that provide frequent changes in visual focus may help lower the incidence of myopia, as seen by the modest but statistically significant negative correlations found between resting

the eyes ( $r = -0.111$ ,  $p = 0.030$ ) and often switching seats ( $r = -0.212$ ,  $p = 0.000$ ). It's interesting to note that characteristics like sleep length ( $r = -0.020$ ,  $p = 0.702$ ) and outdoor activity ( $r = -0.046$ ,  $p = 0.369$ ) do not significantly correlate with myopia, suggesting that they may not be important in its development.

## 4.2. Discussion

### 4.2.1. Genetic History and Family Background

The study's significant contribution of genetic history to the occurrence of myopia is among its most startling conclusions. Students without a family history of myopia had a far lower prevalence rate of 34.78%, but students with both parents having the disease had a 100% prevalence rate. According to the study, students who are genetically predisposed, especially those whose parents are affected are far more vulnerable. These results imply that early intervention techniques and genetic screening may be required to detect and treat at-risk individuals, especially in areas where myopia is high [32].

### 4.2.2. Demographic Factors: Sex, Age, and Region

All age groups continued to have a high incidence of myopia, with students between the ages of 22 and 23 having the highest prevalence (96.67%), closely followed by those over 23 (95.59%). This pattern implies that myopia keeps becoming worse while a student is in college, maybe as a result of increasing academic pressure and prolonged use of digital gadgets, both of which aggravate eye strain and the development of myopia. The fact that students in the older age group (those over 23) also had a high prevalence may suggest that myopia is a problem that affects not just younger pupils but even adults if it is not treated or cured in a timely manne. Additionally, the study discovered that urban students had somewhat higher myopia rates (94.54%) than rural pupils (92.04%). Although the difference is not significant, it raises the possibility that the increased incidence may be caused by urban life, which usually exposes people to more artificial lighting and digital gadgets [33].

### 4.2.3. Academic Faculty and Study Habits

The study's findings about the frequency of myopia in various academic faculties are also noteworthy. Prevalence was highest among students in the Faculty of Economics (100%), and lowest among students in Medical Technology (90%). The different types of courses and study styles found in each faculty may have an impact on this diversity. Economics students are more likely to read, study, and use computers, all of which can lead to eye strain and the development of myopia. On the other hand, students pursuing technical or medical degrees could devote more time to hands-on, practical tasks that need less extended close labor, which could help explain why myopia is somewhat less common in these disciplines [34].

### 4.2.4. Behavioral and Environmental Factors

It's interesting to note that the prevalence was somewhat greater among students who performed daily eye exercises (96.92%) than among those who did not

(91.30%). Students who are more mobile in their sitting arrangements are probably also more involved in academic activities that need near attention, including reading or using digital devices, even if shifting seating positions may seem like a way to lessen eye strain. Consequently, frequent seat changes might not always be associated with a decreased incidence of myopia [35].

#### **4.2.5. Device Usage and Screen Habits**

Additionally, the study discovered that a high incidence of myopia (92.93%) is linked to extended usage of computers and mobile devices ( $\geq 1$  hour per day). Furthermore, reading from an electronic screen in the dark is associated with significantly greater prevalence rates, particularly when done regularly. The prevalence among individuals who engage in this practice is 98.87%. These results demonstrate how important digital screen use is to the onset and progression of myopia. Because extended screen time can strain the eyes and encourage the development of myopia, previous research has found a clear correlation between excessive screen time and the start of myopia. Public health initiatives in Mogadishu should concentrate on cutting back on screen time to solve this problem, encouraging the use of proper lighting, and promoting habits such as taking breaks from screens to rest the eyes [36].

#### **4.2.6. Outdoor Activity and Sleep Patterns**

In Mogadishu, Somalia, the high rate of myopia among college students is an urgent problem that needs focused attention. The results of this study indicate that the development of myopia is influenced by a mix of lifestyle choices, demographic traits, and hereditary factors. The results of this study indicate that the development of myopia is influenced by a mix of lifestyle choices, demographic traits, and hereditary factors. Through awareness campaigns, improved eye care techniques, and preventative measures, important contributing factors including excessive screen time, bad posture, and a lack of outdoor movement may be addressed [37].

#### **4.2.7. Genetic Factors and Family History**

The ANOVA findings unequivocally demonstrate a strong link between genetic history and myopia prevalence with a substantial difference in prevalence between students with a family history of myopia and those without ( $F = 46.597$ ,  $P < 0.001$ ). The prevalence rate for students with both parents having myopia is 100%, while the prevalence rate for students without any family history is much lower at 34.78%. This suggests that students in Mogadishu who have parents with myopia may be at a much higher risk of developing the condition themselves. As genetic factors are non-modifiable, awareness programs aimed at these students could be particularly beneficial in preventing the onset or progression of myopia [38].

#### **4.2.8. Behavioral Factors**

The frequency of myopia is lower among students who only change their desk height once a term (86.54%) than among those who never do so (95.48%). A good

posture while working and studying depends on the desk and chair heights being adjusted correctly. This implies that keeping a good posture when reading could not prevent myopia and might even contribute to its onset. If the posture recommendations stated here are followed too closely or improperly, they may cause eye strain, suggesting that other variables, such as screen time and reading habits, are more closely related to myopia than posture alone [39].

#### **4.2.9. Eye Exercises and Posture**

The study also emphasizes how posture affects the development of myopia, especially in kids who maintain good posture when reading. Myopia is 100% prevalent in those who hold their fingers an inch from the tip of the pen, their eyes one foot from the book, and their chest a “punch” away from the table ( $F = 4603.896$ ,  $P < 0.001$ ). This implies that keeping a good posture when reading could not prevent myopia and might even contribute to its onset. If the posture recommendations stated here are followed too closely or improperly, they may cause eye strain, suggesting that other variables, such as screen time and reading habits, are more closely related to myopia than posture alone [40].

#### **4.2.10. Environmental Factors**

The prevalence of myopia is strongly correlated with environmental variables, including light conditions, screen habits, and gadget usage. According to the ANOVA results, reading in low light levels is significantly associated with using electronic displays at night ( $F = 129.427$ ,  $P < 0.001$ ). The prevalence of myopia is high (98.87%) among students who read at night while using electronic devices with the lights off. Long-term screen use, particularly in poorly lit areas, can cause severe eye strain, which is a known risk factor for the development of myopia. This implies that the connection between screen time and myopia is more complex and that certain behaviors like reading in the dark have a greater impact than total screen time [41].

#### **4.2.11. Outdoor Activity and Sleep**

Interestingly, there is no significant correlation between outdoor activity and myopia, according to the ANOVA data ( $F = 0.810$ ,  $P = 0.369$ ). The results of this study reveal that outdoor exposure may not have as much of an impact on myopia risk as other studies have suggested. This is especially true for university students in Mogadishu. In a similar vein, sleep duration did not significantly affect myopia development ( $F = 0.146$ ,  $P = 0.702$ ), indicating that other variables, such as screen habits or genetic predisposition, may be more important. The study's findings offer strong proof that myopia is quite common among Somalian university students in Mogadishu and that a number of environmental and genetic variables play a role in its development. Students are predisposed to myopia in large part due to their genetic background, especially if they have a family history of the problem. The necessity of upholding appropriate ergonomic practices is highlighted by the behavioral factors that also affect myopia rates, such as the frequency of seat changes,

desk height modifications, and posture when reading [42].

The findings imply that myopia develops as a function of both behavioral and hereditary factors. Myopia and family genetic history have a substantial association, which is consistent with other research showing that genetic susceptibility is the main risk factor. But the risk of myopia is also greatly influenced by behavioral patterns, particularly those pertaining to screen usage and posture when reading [43]. A significant factor is keeping the eyes near to the reading material or screen, as evidenced by variables like reading while reclining down, reading with electrical lights off, and chest one punch of the table [44]. This lends credence to the notion that extended close work and bad posture when reading exacerbate eye strain and accelerate the development of myopia. These results are consistent with research indicating that near-work activities, such extended screen usage or bad reading postures, may increase the incidence of myopia, especially in children and young people [45].

On the other hand, measures such as resting the eyes and frequent changes in seating postures tend to lower the probability of myopia [46]. This implies that different visual distances and eye relaxation may slow the growth of myopia. This is in line with earlier studies that show how eye breaks and time spent concentrating on far-off items can mitigate the negative effects of extended near labor. Sleep duration and outdoor activities do not significantly correlate with myopia [47]. Even while some research indicates that spending more time outside helps prevent myopia by increasing exposure to natural light, this finding may suggest that the length and intensity of outdoor activities may not be enough to slow the advancement of myopia. Furthermore, the lack of relevance for sleep length implies that although sleep is necessary for maintaining eye health generally, it might not have a direct effect on the development of myopia [48].

## 5. Conclusions

The research finds that 93.23% of university students in Mogadishu, Somalia, have myopia, which is a startlingly high incidence. The results show that behavioral variables and genetic predisposition both play a major role in myopia development. Students who have a family history of myopia are far more likely to get the disorder, especially if both parents have it. Myopia is also strongly predicted by poor posture and reading habits, such as reclining down when reading, reading with electrical lights off, and keeping a tight gap between the chest and the table. On the other hand, actions that promote visual rest, like switching seats often and taking regular rests for the eyes have a protective impact. Notably, myopia in this group does not seem to be significantly influenced by variables like screen usage, outdoor exercise, or sleep length.

It is advised that educational institutions and public health authorities put in place focused intervention programs to lower the prevalence of myopia in students in light of these findings. The significance of good reading posture and ergonomic classroom practices such as keeping a sufficient distance between the

eyes and reading materials and rearranging desks and chairs to accommodate different heights should be emphasized in such programs. Campaigns to raise awareness should also stress how important it is to take frequent pauses from near-work activities. For pupils who have a family genetic tendency to myopia, frequent vision screening should be promoted due to the close correlation. In order to better understand the behavioral and environmental variables that may contribute to the advancement of myopia in comparable groups, as well as to investigate new preventative methods, more study is required.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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