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THE IMPACT OF EXTENDED SCREEN TIME ON EYE HEALTH AMONG UNIVERSITY STUDENTS IN KARACHI: A CROSS-SECTIONAL STUDY

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Abstract

Background: *The extensive use of digital devices has become a prominent aspect of university students' daily lives, often leading to prolonged screen time. This trend raises concerns about its potential impact on eye health, particularly in young adults who are susceptible to digital eye strain and related issues.*

Methods: *This cross-sectional study surveyed 350 university students in Karachi, Pakistan, to assess their screen time habits and its perceived impact on eye health. We collected data on the frequency and duration of screen use, as well as symptoms like eye strain, dryness, and sleep disturbances. Participants' responses were categorized into levels of impact to explore how they perceive screen time's effect on their ocular health.*

Results: *Of the students surveyed, 40.6% believed their screen time "very much" affected their eye health, while 31.1% felt a "moderate" impact. Common symptoms reported included eye strain (67%), dryness (52%), and sleep disturbances (45%). There was a significant correlation between higher screen time (more than 5 hours per day) and the severity of these symptoms ($p < 0.05$).*

Conclusion: *University students in Karachi are notably aware of the adverse effects of prolonged screen time on their eye health. However, despite this awareness, many continue excessive screen use. Increased awareness campaigns and preventive measures, such as screen ergonomics and routine eye check-ups, could help mitigate the eye health risks associated with extended screen exposure among students.*

INTRODUCTION

BACKGROUND OF THE STUDY:

Our goal is to understand how looking at screens for a long time affects college students' eye health (1). We focus on the effects of increased screen time on students' eye health (2). Remember, vision is important, making up 80% of our senses (3). Too much time on devices or computers might harm your eyes. Most students today are hooked on tech gadgets for entertainment, spending a lot of time on screens. Kids playing less, moving less, this can lead to health problems (4). More and more university students are using laptops, a big deal in Karachi's universities. Here, students devote a lot of time to computers and laptops. Ever heard of digital eye strain or eye fatigue? These are vision issues people deal with after using devices like computers, cellphones, laptops, tablets and e-readers for too long. Many individuals develop this condition due, to their prolonged use of displays (5).

Too much time on screens can cause issues. These can include headaches, dry eyes, or even blurry vision. You might feel discomfort in your neck and shoulders. Your eyes could even feel strained. Many students rely on computers, for their activities and studies which negatively impacts their quality of life and exacerbates their health problems (5). About half of 217 people surveyed have felt the burn of screen strain, as per the Indian Journal of Ophthalmology. Our heads pound a lot (53.9%) and our eyes get annoyed as common signs. The study pointed out the wide occurrence of screen strain and its hand in eye health problems from lots of gadget use. The rise in online learning use by students is just one example of how nearsightedness can happen to people. Number six (6). In Pakistan, these issues were put on the back burner by other more urgent matters like health or money problems. According to the World Health Organization, a whopping 2.2 billion people worldwide have issues with their eyes. Can you believe that almost 91% of people said their eyes hurt from using tech devices too much? Turns out, women often get headaches or dry eyes. In fact, about 44% people reported headaches. Others said they felt eye pain (29%), their eyelids seemed heavy (about 24%) and their sleep was disturbed (a big 74%) (3

STATEMENT OF THE PROBLEM:

Digital gadgets are becoming common teaching tools, but they pose problems. In Karachi's private universities, like schools everywhere, digital device use for teaching is up. The downside We're seeing students' eye health suffer because of too much screen time. The harmful effects can include digital eye strain, myopia, and more. These problems can come from spending too much time on screens for school activities. Things like studying, homework, and virtual classes can all lead to eye issues. Using this study, we plan to point out these problems due to too much screen time

SIGNIFICANCE OF THE STUDY:

Due to the frequently rigorous educational applications provided by means of non-public sector universities, any negative consequences on a pupil's eye fitness can also have an impact on their academic achievement. The work's importance resides in its potential to shed light on the methods that extended display time can purpose pain and eye strain, each of that may impair instructional overall performance. The significance of this observe is in addition accelerated by means of the finding that extended screen usage is a major thing contributing to myopia among college students in Karachi. Globally, human being's worries approximately myopia are developing. Increased healthcare charges for individuals as well as society are many of the long-time period repercussions of myopia. In contexts other than education, extended screen use may be detrimental to a student's eye health. The significance lies in knowledge how screen time control can beautify college students' comfort and well-being.

OBJECTIVES:

Look into the link between long-term screen time and the strain it puts on the eyes of Karachi university students. Determine if a correlation exists between myopia cases and those in Karachi who spend more time in front of screens. Check if using screens too much leads to disturbed sleep and impacts student sleep routines. Gauge students' awareness, understanding, and willingness to apply precautions to minimize screen usage's effect on their eyesight.

OPERATIONAL DEFINITIONS:

1) **EXTENDED SCREEN TIME**: The amount of time each day spent using digital screens, including but not limited to computers, laptops, tablets, and smartphones for academic and recreational activities. Extended screen time is considered to be more than four hours per day.

2) **DIGITAL EYE STRAIN:** refers to a group of symptoms related to the eyes that can include headaches, eye pain, dryness, redness, and weariness. The study participants have to report any symptoms they experience either during or after using a screen.

3) **MYOPIA (Nearsightedness):** Is defined as a refractive error in which distant objects appear blurry. In the context of this study, myopia will be determined through participant self-report, existing diagnoses, or measurements taken by an eye care professional.

4) **SLEEP DISTURBANCES:** Is refer to any disruptions in the participants' sleep patterns and quality of sleep. This includes difficulties falling asleep, waking up frequently during the night, or experiencing poor sleep quality. Sleep disturbances are self-reported by the participants.

5) **SCREEN TIME MANAGEMENT PRACTICES**: Include the strategies and behaviors adopted by participants to mitigate the impact of extended screen time on their eye health. These may include practices such as taking breaks, using blue light filters, adjusting screen brightness, and following the 20-20-20 rule.

6) **AWARNESS AND KNOWLEDGE**: Are assessed by participants' self-report regarding their understanding of the potential eye health issues associated with extended screen time and their awareness of protective measures.

SUMMARY:

Extended use of monitors is associated with digital eye stress, which manifests as dry eyes, redness, weariness, and blurred imaginative and prescient. Growing quantities of time spent in front of screens are notion to be contributing to the increasing occurrence of myopia, or nearsightedness, amongst university students. Students' sleep cycles can be disrupted and their quality of sleep reduced by way of prolonged screen use, especially overdue at night time. Institutions have to set up guidelines and approaches and increase public expertise of the negative results of screen utilization on eye fitness which will decrease the chance of eye-associated troubles.

LITERATURE REVIEW:

INTRODUCTION:

In current times, the fast advancement of digital era has basically transformed the higher education environment by means of transforming how college students have interaction with their coursework, collaborate with friends, and get right of entry to data. Because they offer unprecedented ease and versatility, the sizable use of virtual gadgets—consisting of computer systems, drugs, and smartphones—has revolutionized schooling. The virtual revolution has, however, given upward push to a new generation of issues, one of that's the capacity impact of extended display time at the ocular fitness of university students. Examining and assembling the frame of existing understanding on this subject matter is the goal of this overview of the literature. Knowing how prolonged display time impacts eye fitness is critical when you consider that college students rely increasingly on virtual monitors for observe, studies, and amusement. This overview pursuits to shed light on loads of subjects related to this difficulty, such as the superiority of screen time amongst college students and the many effects it could have on eye health.

Presenting a complete understanding of the problematic connection among prolonged screen time and eye fitness in university college students is the intention of this evaluate. Examining the

prevalence of display time amongst this populace, the signs of digital eye strain experienced by using students, any connections among extended display screen time and the development of myopia (nearsightedness), and the results on sleep cycles and common eye fitness are all a part of this take a look at. A review of recommended actions and treatment plans aimed at decreasing the bad consequences of prolonged display screen time on college students' eye fitness can also be blanketed inside the assessment.

As virtual generation maintains to transform education, this research evaluation is a beneficial useful resource for educators, college students, and clinical experts. It raises awareness of the issues added on by extended display time, but it also offers tips for future strains of inquiry, advised legal guidelines, and realistic answers to shield students' eye health.

A have a look at become carried out wherein Mapping screen usage, examining college students' on-line learning behavior, and pinpointing problems with visible cleanliness were the dreams of the undertaking. 389 undergraduate and 211 graduate college students out of 600 general students took part within the on-line survey. Grad students). The Chi-square test of independence become used to have a look at the relationship. Level of education, time spent in the front of gadgets, use of eyewear, medicinal drug intake, and sharper imaginative and prescient. P < zero.05 become the brink for significance. To collect facts on class elements, a 3-factor rating machine was devised. Even whilst one in seven undergraduate students spent as a minimum eight hours an afternoon in the front of a display, 1six postgraduate college students pronounced the use of monitors for at the least nine hours each day. Greater than ninety% of student frame. (7) .

Another look at used Google Forms to present students get right of entry to to a web survey that was open for six weeks. The college students were reached out to the use of diverse social media channels. Numerous topics, including ergonomic person-associated elements that effect digital eye stress, were blanketed inside the questionnaire. Three medical colleges from Haryana have participated in the study: Pt. B.D Sharma PGIMS in Rohtak; Kalpana Chawla Government Medical College in Karnal; and Maharaja Agrasen Medical College in Agroha, Hisar. The 3 universities obtained 580 replies, which means that the common age of the 551 college students that participated inside the ballot became 21.12 ± 2.02 yearsI.E. The availability of on-line classes led to a statistically sizable ($p < 0.05$) growth in average display screen time of 106.61% (3.54 ± 0.15 hours). Of the gadgets, 485 have been mobile telephones, making approximately 82%. Out of the people who replied to the survey, 88.02% (n=485) mentioned having as a minimum one virtual eye strain symptom, and seventy six.Seventy seven% (n=423) reported having at the least one non-ocular result. Fatigue and heavy eyes were the most often reported ocular signs and symptoms (73.87%), whereas difficulties focusing (48.82%) become the maximum frequently pronounced non-ocular symptom. According to the findings, ladies had been much more likely than men to have each ocular (92.03%) and non-ocular (82.61%) signs. (8)

The information is located out by means of the author in a few different have a look at. About 25% of the placed occurrence of myopia may be attributed to virtual display screen use, in step with a observe carried out on teens in Denmark. When people use virtual monitors for more than six hours a day, their probabilities of developing myopia boom. The World Health Organization estimates that at least 2.6 billion human beings global—many of whom are below the age of 18—battle with imaginative and prescient impairment. It is projected that 5.7 billion human beings, or fifty nine.6% of the global population, will revel in myopia thru the three hundred and sixty five days 2050. (9)

According to a second take a look at accomplished in Shanghai, severe myopia bills for 19.5% of all myopic college students, with myopia affecting 94.Nine% of undergraduates and 96.Nine% of graduate students. (10).

A further observe performed in Saudi Arabia by the author examines that Students' DES multiplied following a 12 months of digital instruction. Risk elements need to be looked after to stop DES and its consequences on students. 704 students' responses had been examined. DES prevalence became 59.Four%, with a 95% self-belief c programming language of 55.0–sixty three.8. In all, DES rankings for moderate (scoring 12–18) and intense (scoring 18) pupils were 24% and 14%, respectively. The number one symptoms and signs and symptoms of DES had

been eye stress (10.1%), impaired vision (10.Eight %), headache (20.Nine %), and teary or watery eyes (12.5 %). Students who wear glasses, use screens for extra than four hours a day, maintain their devices 25 centimeters or much less from their eyes, spend greater than four hours an afternoon in digital classrooms, and are women had been determined to have extensively extra intense grades for DES. There have been several large predictors of slight and extreme DES, which includes being lady (P = 0.16), undertaking 1 hours of outside activity (P = 0.02), spending 2 hours a day in the front of a display screen (P = zero.24), and spending 4 hours an afternoon in digital school rooms (1001). A decrease instructional ranking and issues with eye fitness had been associated with severe DES. (11)

Another study carried out in Pakistan According to a Pakistan Telecommunication Association (PTA) survey, South Asia has visible a technological growth, with Pakistan main the way with over 139.2 million mobile telephone subscribers. Long-time period screen utilization is known to boom the chance of numerous visual troubles, together with myopia and moderate pressure in addition to complications. Extended screen utilization has been connected to ocular signs like irritation, dry eyes, impaired vision, eye strain, and pain from glare, in line with a cross-sectional have a look at performed at Government College Rawalpindi. (12).

Variables:

INDEPENDENT VARIABLE: (Type of university public vs private)

The kind of university that the students are enrolled in is the study's independent variable. This variable separates students into two groups: those who attend universities in the public and private sectors.

DEPENDENT VARIABLE: (Eye Health)

Students' eye health is the study's dependent variable. As eye health is a broad term with many facts, you might decide to concentrate on particular elements like: digital eye strain, myopia, sleep disturbance.

CONCEPTUAL MODLE:

Research method:

Study setting:

Students of 2 private and 2 public universities of Karachi.

Study design:

A cross sectional study over extended screen time on the eye health of university students.

Study duration:

Study duration from 1 year December 2023 to December 2024.

Target population:

Age group of above 18 to 26 years male and female both.

Sample technique:
The sample technique which we use in this study is a straightforward random sampling method.

Sample Size: The number of samples will be 250 with confidence level 95% and the bound error 5% with population portion 50%.

Sample selection:
Inclusion criteria:
University students, Myopic Patients

Exclusion criteria:
Mentally retarded, children

Tools for data collection:
For collecting data the tool which we use is a questionnaire.

Data collection method:
Data collection which we used in this research is close ended questionnaire method.
Ethical consideration:
Following points are the ethical consideration that will be in the study:

1: Voluntary Participation: Free to choose to participate without any pressure or coercion

2. Confidentiality Makes ensuring the study team is the only party to whom the participant's identity, private information, answers, etc. are revealed.

3 Anonymity: by protecting participant privacy

Data Analysis:
Age and Screen Time Correlation with Eye Health
Younger students, particularly those aged 18 to 23, tend to spend more time on digital devices for studying and socializing. This increased screen time can lead to issues such as digital eye strain, myopia, and dry eyes.

Gender Differences in Ocular Health
interestingly, female students often report experiencing higher levels of eye strain and dry eye syndrome compared to their male counterparts. This disparity could stem from different screen usage habits or even biological differences between genders.

Year of Study and Screen Time Exposure
Students in their second and third years face greater academic demands, which often results in extended screen time and increased eye strain. It's worth investigating whether this cumulative exposure affects their eye health over time.

Qualification Level
a staggering 94.6% of our respondents are undergraduates, suggesting that younger students may engage in longer screen usage for both academic tasks and social interactions, potentially impacting their eye health more than graduate students.

University Type (Public vs. Private)
When comparing eye health across public and private universities, the differences in digital learning infrastructure become evident. Private universities may offer more digital resources, which could lead to longer screen time and increased eye strain.

- **Public vs. Private Universities in Karachi:** In Karachi, we surveyed two public and two private universities, revealing that undergraduates spend significant time on screens for both studies and social media.
-

Pre-existing Ocular Conditions
only a small percentage of students (1.7%) reported having pre-existing eye conditions. This indicates that any increase in eye-related symptoms is likely a result of heightened screen time rather than existing health issues.

Long Screen Time and Eye Strain
While we don't have precise data on screen time, we can observe trends based on symptoms like dryness, headaches, and blurred vision. It's crucial to consider the cumulative effects of prolonged screen use in relation to these specific symptoms.

Discussion:
our findings reveal a significant correlation between extended screen time and eye strain among students. Younger individuals, particularly those in their

second and third years of study, are especially vulnerable due to their heightened use of digital devices for both academic and social purposes.

Our data paints a compelling picture of how extended screen time is taking a toll on students' eye health, showing a clear and significant link between high levels of digital device usage and symptoms of eye strain. This relationship seems to be particularly pronounced among younger students, with those in their 2nd and 3rd years of study being notably affected. This age group is in a unique position, balancing demanding academic schedules and a socially active lifestyle, both of which now largely revolve around screen-based activities.

For many of these students, digital devices are not just tools for occasional use—they're integral to their daily routines. Academically, a typical day might involve back-to-back hours of online research, digital note-taking, video lectures, and accessing e-books or academic papers, all of which require intense screen focus. As coursework progresses, assignments become more complex, and students find themselves spending more and more time on their devices to keep up with these demands. This prolonged, close-up screen exposure can put significant strain on the eyes, leading to discomfort and fatigue.

Beyond their academic commitments, these students are also very active on social media and other online platforms as a way to stay connected with friends and family. In fact, for many, socializing is nearly synonymous with screen use, as they communicate primarily through messaging apps, share moments on social media, or even relax by streaming shows and movies. This generation has grown up in a world where screens serve as both a social and educational lifeline, which has made these digital habits seem almost second nature. However, all this screen time adds up, creating a cumulative impact on their eyes that often goes unnoticed until symptoms of eye strain set in.

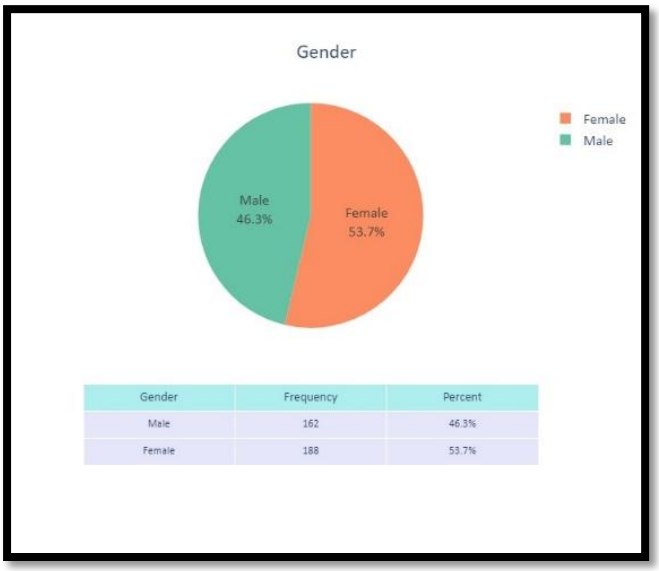
One major component here is the constant transition between different types of digital tasks, from academic to personal, without giving the eyes a chance to fully rest and recover. Unlike traditional forms of study, where students might switch between reading a textbook, taking handwritten notes, or discussing ideas face-to-face, screen-based work involves prolonged exposure to bright screens, often in poor lighting conditions. The nature of digital work demands high focus, sometimes for hours on end, which means students may unconsciously blink less, causing dryness and discomfort in the eyes.

In many cases, students are not fully aware of the effects of this extended screen time, so they might dismiss symptoms like mild headaches, blurry vision, or dry eyes as temporary. However, these are early signs of digital eye strain, which can worsen over time if proper care isn't taken. As they move further into their academic careers, the demands only grow, meaning their exposure to screens will likely continue to increase unless steps are taken to manage it.

The link between screen time and eye strain among younger students, especially those balancing heavy coursework with active social lives, is a call for greater awareness about digital eye health. Simple adjustments—such as taking regular breaks, using blue-light filters, or adjusting screen brightness—can make a big difference. But for many students, these habits aren't yet ingrained, which is why universities could play a crucial role in promoting these practices through awareness campaigns and eye health resources.

Overall, the findings show that younger students, particularly those in their 2nd and 3rd years, are at a higher risk for experiencing symptoms of eye strain due to their prolonged use of digital devices. This combination of academic pressures and social engagement through screens has created an environment where eye health is at risk, highlighting the need for students to adopt preventive habits and for institutions to support them in managing their screen time effectively.

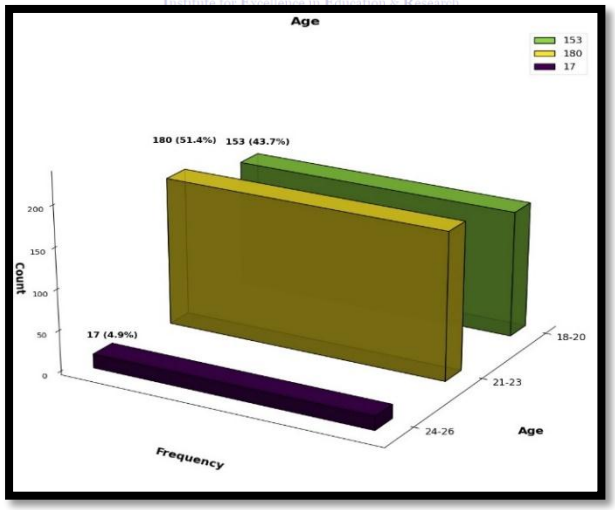
RESULTS:



Gender	Frequency	Percent
Male	162	46.3%
Female	188	53.7%

Based on the topic, **"The Impact of Extended Screen Time on Students' Eyes in Public and Private Universities,"** the gender distribution of **53.7% female** and **46.3% male** students provides valuable insights.

This balance in male and female participation allows us to explore if extended screen time affects eye health differently for each gender. For instance, we might observe if one gender is more prone to issues like eye strain, dryness, or blurred vision due to long hours on screens. By comparing results between male and female students, we can better understand any unique patterns in eye health concerns, helping universities in Karachi to address these issues more effectively across their diverse student populations.



3D bar chart-1: (AGE)

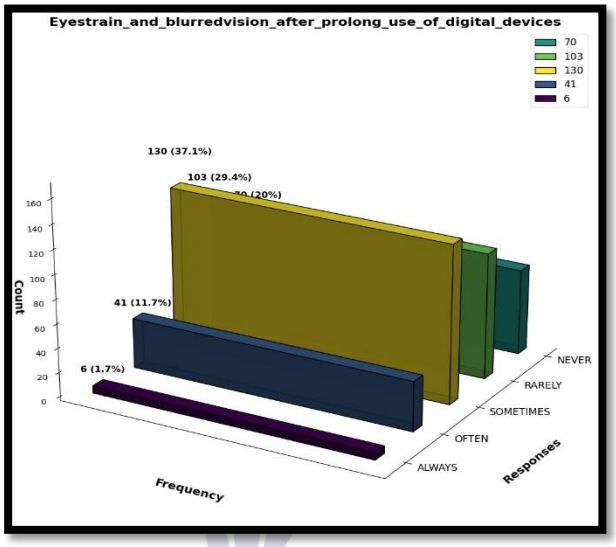
The **3D bar chart-1** shows the age distribution of students in your study on the impact of extended screen time on eye health in public and private universities.

- The **21-23 age group** has the highest number of participants, with **180 students (51.4%)**.
- The **18-20 age group** follows closely, with **153 students (43.7%)**.

- The **24-26 age group** has the fewest participants, with only **17 students (4.9%)**.

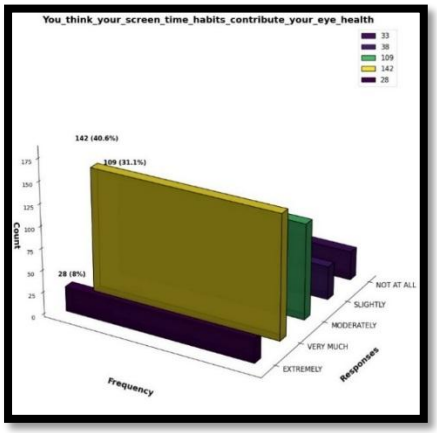
This distribution indicates that most of the study'sparticipants are between 18 and 23 years old, which aligns with the typical age range of university students. Since younger adults may have different screen time habits and possibly varying levels of awareness about eye health, this concentration could provide insights into how extended screen time affects eye health among this age group. The smaller number of students aged 24-26 suggests limited representation for older students, which might influence the generalizability of the findings for that age range.

3D bar chart-2(eyestrain and blurred vision)



The **3D bar chart-2** shows that most students experience **eyestrain and blurred vision** from long screen time. About **two-thirds (66.5%)** say they feel these symptoms **often or sometimes** after using digital devices. A smaller group (20%) experiences these symptoms **rarely**, while only a few students say they **never** or **always** have these issues.

This suggests that screen time is impacting many students' eye health, with varying levels of severity. It highlights a need for awareness and strategies to help students reduce eye strain from prolonged device use.

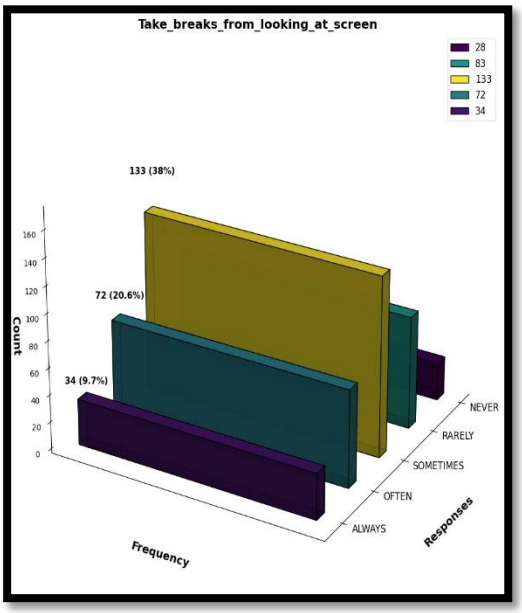


3D bar chart-3 (how much their screen time habits contribute to their eye health issues)

The 3D bar -chart-3 illustrates students' perceptions of how much their screen time habits contribute to their eye health issues. Here's a breakdown of the responses:

- 40.6% (142 students) feel that their screen time habits contribute to their eye health issues very much.
- 31.1% (109 students) believe their screen time habits contribute moderately.
- 10.9% (38 students) think their screen time impacts their eye health slightly.
- 9.4% (33 students) feel it contributes not at all.
- 8% (28 students) believe screen time habits contribute extremely to their eye health issues.

Overall, a large majority (71.7%) believe their screen time habits significantly impact their eye health, either "very much" or "moderately." This reflects a strong awareness among students that their screen usage may be causing or worsening eye-related symptoms. The relatively small number who feel screen time has little to no effect suggests that most students are conscious of a link between extended screen use and eye health, underlining the importance of promoting healthy screen habits in university settings.



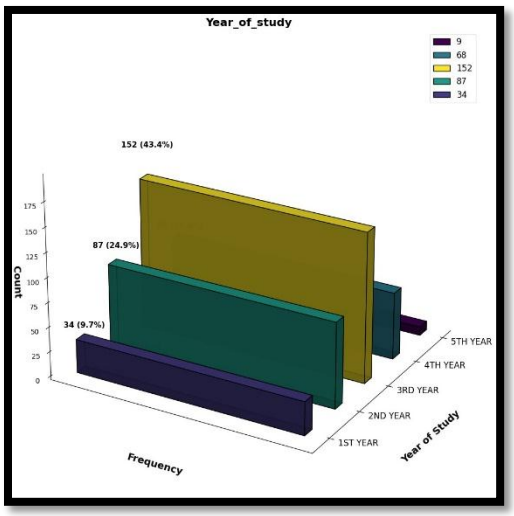
3D bar chart-4(frequently students take breaks from looking at screens)

The **3D bar chart-4** represents how frequently students take breaks from looking at screens. Here's a summary of the responses:

- **38% (133 students)** say they **sometimes** take breaks.
- **20.6% (72 students)** report taking breaks **rarely**.
- **9.7% (34 students)** indicate they **always** take breaks.
- **24% (83 students)** take breaks **often**.
- **8% (28 students) never** take breaks.

The data shows that most students are aware of the importance of taking breaks, with around 62% (combining "sometimes," "often," and "always") incorporating breaks into their screen time to some degree. However, a significant number still rarely or never take breaks (28.6%), which may put them at higher risk for eye strain and other screen-related issues. This suggests an opportunity to promote the importance of regular screen breaks among students to support better eye health.

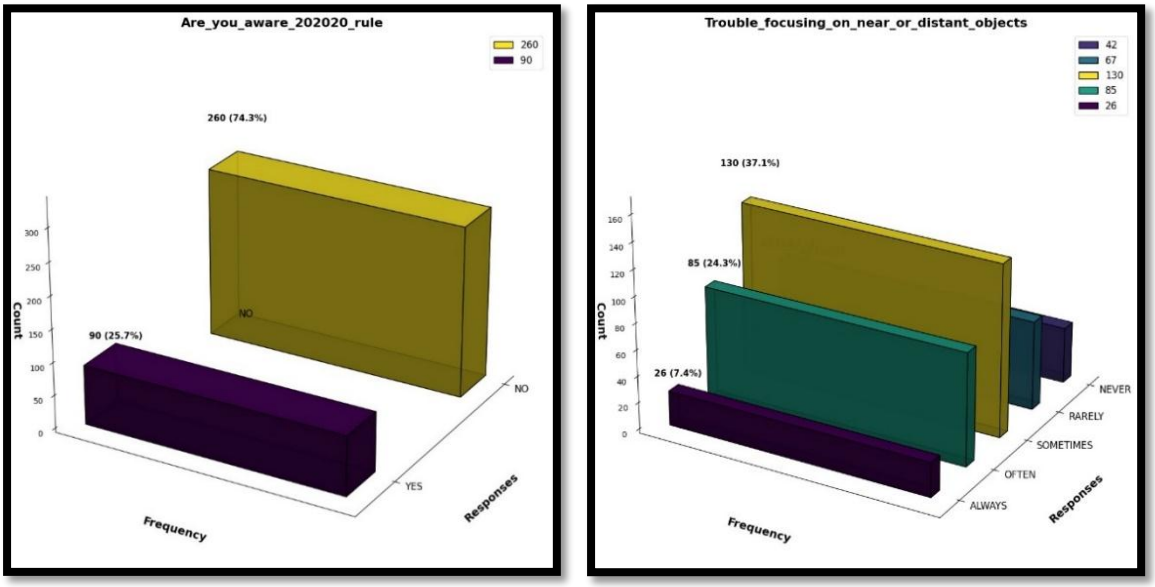
3D bar chart-5: (Year of study)



The **3D bar chart-5** the distribution reveals that third-year students form the majority of the respondents, followed by second-year students, suggesting a higher engagement or response rate among mid-level students compared to those in their initial or final years. This trend may reflect varying levels of academic involvement or differing awareness and priorities regarding the subject matter across different stages of study.

3D bar chart-6: (Trouble focusing on near and distant objects)

The findings reveal that over half of the students experience at least occasional difficulties with focusing on near or distant objects, with a notable portion (37.1%) sometimes facing this issue and a smaller group frequently or consistently experiencing it. This trend could suggest a prevalent strain on visual health, possibly linked to prolonged screen use, which warrants further attention to visual hygiene practices among students**.**



3D bar chart-7: (Are you aware 20-20-20 rule)

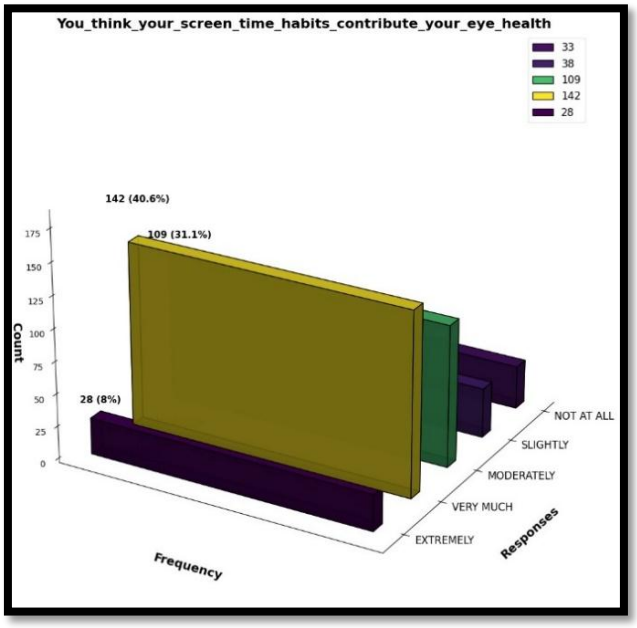
The 3D chart-7 (“Are_you_aware_2020_rule" shows the results of a survey asking people if they are aware of the 20-20-20 rule.)
Key Findings:

- Majority unaware: The majority of respondents (74.3%) were not aware of the 20-20-20 rule.
- Minority aware: Only 25.7% of respondents were aware of the rule.

Interpretation:
This data suggests that there is a significant lack of awareness about the 20-20-20 rule, which is a simple technique to reduce eye strain from prolonged screen use.
Recommendations:

- Awareness Campaigns: It is important to increase awareness about the 20-20-20 rule through educational campaigns and public health initiatives.
- Workplace Initiatives: Employers can promote the 20-20-20 rule in workplaces to encourage employees to take regular breaks from screens.
- Educational Programs: Schools and colleges can incorporate lessons about eye health and the 20-20-20 rule in their curriculum.

By raising awareness about the 20-20-20 rule, we can encourage people to adopt healthy eye habits and reduce the negative impact of screen time on their eye health.



3D bar chart-8:(You think your screen time habits contribute your eye health)

This 3D bar chart-8 represents the responses from university students regarding their perception of how their screen time habits impact their eye health. The topic aligns with your research focus on the effects of extended screen time on students' eye health. Here’s an analysis based on the chart:

1. Majority Awareness: A significant portion of respondents (40.6%) feel that their screen time habits "very much" impact their eye health. This indicates a strong awareness among students of the potential
2. consequences of prolonged screen use on eye health.
3. Moderate Concern: Another large group (31.1%) reports feeling "moderately" affected. This suggests that while these students are aware of potential risks, they may perceive the impact to be less severe or manageable.
4. Minimal Concern: Smaller groups believe that screen time affects their eye health "slightly" (10.9%) or "not at all" (8%). This subset may lack full awareness of the potential

long-term effects of screen use or may not have experienced noticeable symptoms.

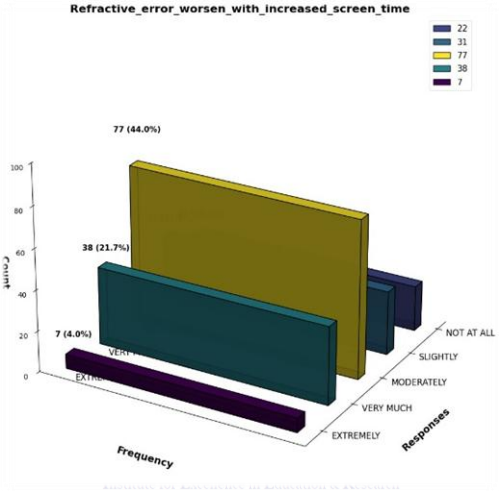
5. High Concern for Some: A minority (8%) of respondents feel that screen time impacts their eye health "extremely." These students might have experienced significant symptoms like eye strain, headaches, or vision issues, making them more sensitive to the impact.

Implications for Your Study

These findings suggest that while awareness of screen time's impact on eye health is relatively high, the degree of concern varies. Your study could explore the correlation between this awareness and actual symptoms experienced, such as eye strain, myopia, and sleep disturbances. Additionally, understanding what motivates different levels of awareness could be valuable in developing educational programs to promote eye health and screen time management among university students.

This data provides a foundation for exploring further details about symptoms and preventive behaviors, helping tailor interventions to the specific concerns of university students.

3D bar chart-9:(Refractive error worsen with increase screen time)



Overall Trend: (3D bar chart-9)

The graph shows a clear trend where the majority of respondents believe that their refractive error has worsened with increased screen time.

Breakdown of Responses:

- **44**% of respondents indicated that their refractive error has worsened "Moderately" due to increased screen time.
- **21.7**% feel it has worsened "Very Much."
- **4.0**% believe it has worsened "Extremely."
- **22%, 31%, and 7**% chose the options "Not at all," "Slightly," and "Very Much," respectively.

Interpretation:

The graph suggests a strong correlation between increased screen time and worsening refractive errors among university students. The majority of respondents perceive a significant negative impact on their eye health.

Possible Reasons:

- **Eye Strain:** Prolonged screen exposure can lead to digital eye strain, characterized by symptoms like blurred vision, dry eyes, headaches, and difficulty focusing.
- **Increased Blue Light Exposure:** Blue light emitted by screens can disrupt sleep patterns and potentially contribute to eye fatigue and damage to the retina.
- **Reduced Blink Rate:** Staring at screens can lead to reduced blinking, causing dry eyes and discomfort.

Recommendations:

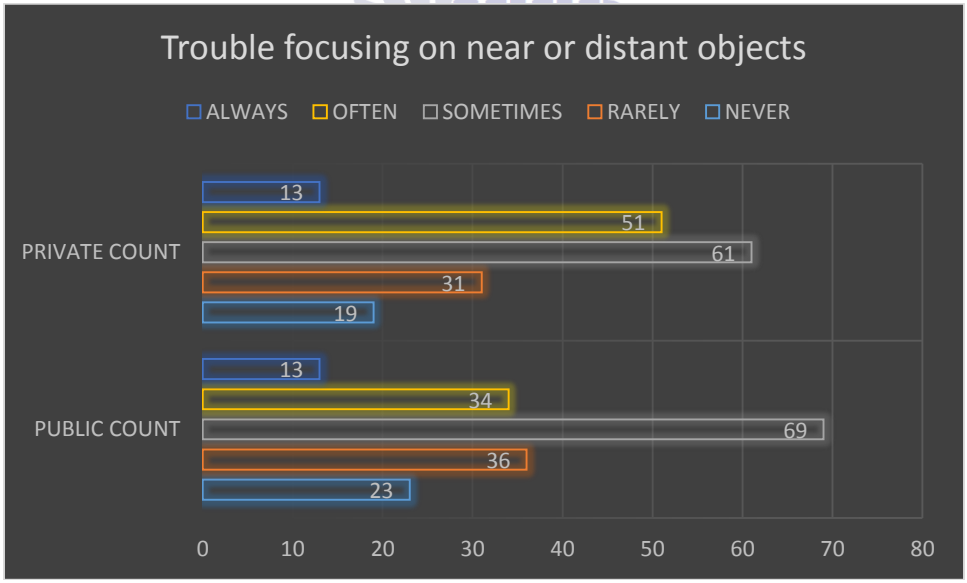
Based on the graph and the potential reasons mentioned above, here are some recommendations to mitigate the negative impact of long screen time on eye health:

- **Practice the 20-20-20 Rule:** Every 20 minutes, take a 20-second break and focus on an object 20 feet away to relax your eyes.
- **Maintain Proper Eye Distance:** Keep a distance of at least 25 inches from the screen.
- **Adjust Screen Brightness and Contrast:** Reduce glare and strain by adjusting the settings to a comfortable level.
- **Use Blue Light Filtering Glasses:** These glasses can help reduce the harmful effects of blue light.
- **Take Regular Breaks:** Get up and move around to reduce eye fatigue and improve blood circulation.
- **Consult an Eye Care Professional:** Regular eye checkups are crucial to monitor eye health and address any potential issues.

- The graph only provides a snapshot of the respondents' perceptions. Further research is needed to establish a definitive causal link between screen time and worsening refractive errors.
- It is important to note that individual experiences and susceptibility to eye problems may vary.

In conclusion, the graph shows a strong correlation between increased screen time and worsening refractive errors among university students. The majority of respondents believe that their eye health has deteriorated due to prolonged screen exposure. This can be attributed to factors like digital eye strain, blue light exposure, and reduced blinking. To mitigate these effects, it is recommended to practice the 20-20-20 rule, maintain proper eye distance, adjust screen settings, use blue light filtering glasses, take regular breaks, and consult an eye care professional. However, further research is needed to establish a definitive causal link between screen time and refractive errors.

Additional Considerations:



The chart compares responses from private and public institutions regarding difficulty focusing on near or distant objects. Here's the analysis:

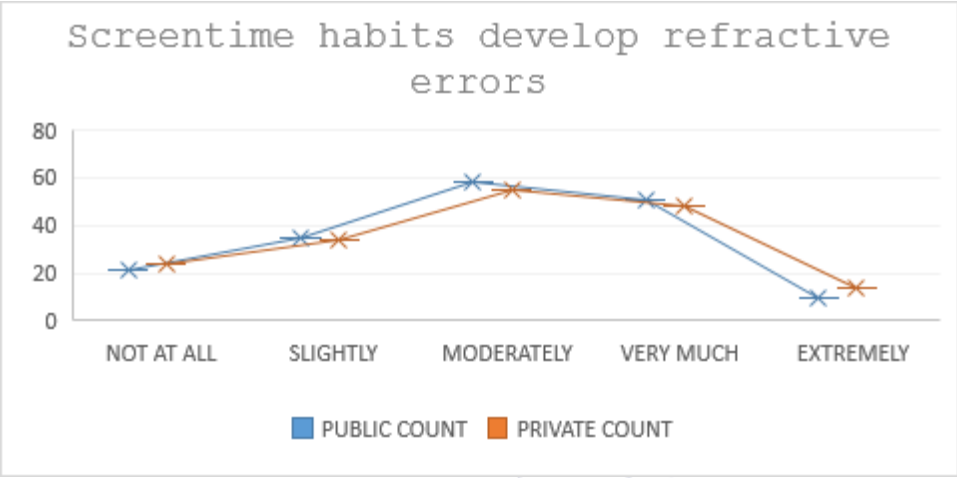
1. **"Always" and "Never" Responses:**
   - Both private and public institutions have a similar count (13) for "Always" facing this issue.
   - A higher number of public institutions (69) report "Never" having this problem compared to private institutions (61).

2. **"Often" and "Sometimes" Responses:**
    - Private institutions show a significantly higher "Often" count (51) compared to public institutions (34).
    - The "Sometimes" count is almost equal, with private institutions at 31 and public institutions at 36.

3. **"Rarely" Responses:**
    - Private institutions have fewer "Rarely" responses (19) than public institutions (23).

Key Observation: Students in private institutions report a higher frequency of trouble ("Often") than those in public institutions. However, public institutions have a higher proportion reporting "Never" facing such issues, suggesting slightly better vision health or fewer reported problems.

The chart examines the perception of whether screen time habits contribute to refractive errors among students in public and private institutions. Here's the analysis:



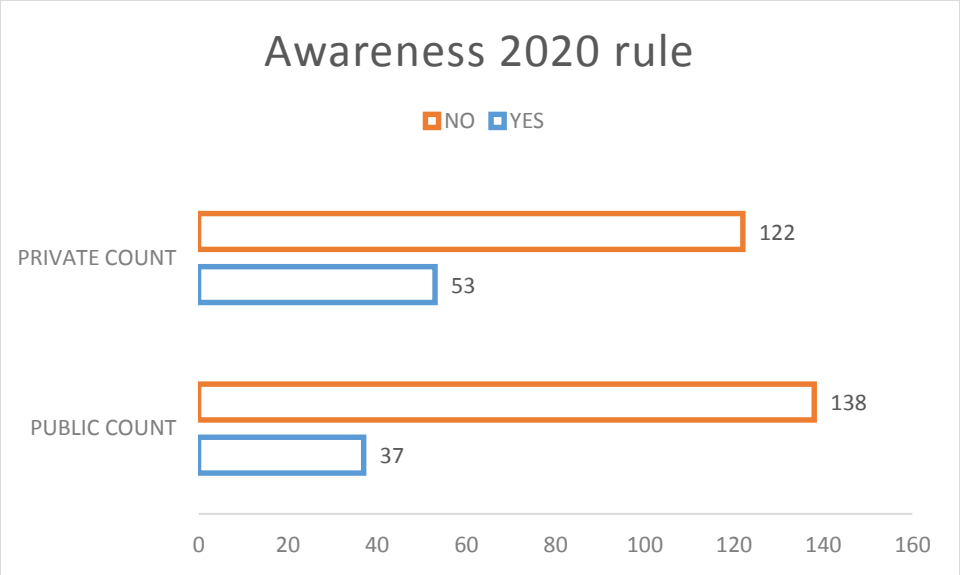
1. **"Not at All" Responses:**
    - Public institutions have a slightly higher count compared to private institutions, indicating more skepticism about screen time causing refractive errors.

2. **"Slightly" and "Moderately" Responses:**
    - Both groups show a sharp increase in agreement, peaking at "Moderately."
    - Public and private counts are nearly equal, showing similar acknowledgment of a moderate impact.

3. **"Very Much" Responses:**
    - The counts slightly decreased for both groups, showing a slight drop in strong agreement.

4. **"Extremely" Responses:**
    - Public institutions report a sharper decline compared to private institutions, indicating fewer students strongly associate screen time with refractive errors.

Key Observations: Students in both sectors generally acknowledge that screen time contributes to refractive errors, with the majority selecting "Moderately." However, private students show a slightly higher tendency to strongly agree ("Extremely"), suggesting they perceive a stronger link between screen
time and vision problems.



The chart explores awareness of the 20-20-20 rule among students in public and private institutions. Here's the analysis:

1. **Awareness ("Yes"):**
   - 53 private institution students are aware of the rule, compared to only 37 in public institutions. This indicates slightly better awareness in private institutions.

2. **Lack of Awareness ("No"):**
   - A large majority in both groups are unaware of the rule, with 122 students in private institutions and 138 in public institutions.

Key Observations: Awareness of the 20-20-20 rule is generally low among both public and private institution students. Efforts to promote eye health education are needed, especially in public institutions, where awareness is the lowest.

The novelty of the study lies in its **comprehensive evaluation of screen time, eye health, and awareness among students in public and private institutions**, with a focus on **key gaps and actionable insights**:

1. **Unique Comparative Analysis**:
   - The side-by-side comparison between public and private institutions (Figures 1, 2, and 3) highlights disparities in vision issues, screen time habits, and awareness levels, which have not been extensively studied in this demographic context.

2. **Focus on Awareness (20-20-20 Rule)**:
   - Figure 3 reveals a critical lack of awareness regarding preventive eye care strategies, emphasizing the need for targeted educational interventions, a rarely addressed area in vision health research.

3. **Holistic Exploration of Eye Health Impacts**:
   - Your study connects **screen time habits** (Figure 2) with specific outcomes like **difficulty focusing** (Figure 1) and refractive error risks, providing a holistic perspective on how modern digital habits affect vision.

4. **Educational and Policy Implications**:
   - The research highlights disparities (e.g., lower awareness in public institutions) and creates actionable opportunities to bridge gaps in **health education**, particularly in low-resource settings like Karachi.

This novel combination of **behavioral insights, health outcomes, and institutional comparisons** makes your research impactful and actionable.

ANALYSIS:

The analysis will explore if gender differences exist in the impact of extended screen time on eye health among university students in Karachi. This will help identify specific needs and tailor interventions for both male and female students to improve their eye health. (CHART -1)

The chart indicates that a significant number of students suffer from eyestrain and blurred vision due to excessive screen time.(CHART-2)

The chart indicates that a significant number of students suffer from eyestrain and blurred vision due to excessive screen time. Additionally, a majority of students believe their screen time habits have a significant negative impact on their eye health. This highlights the need for awareness and strategies to help students reduce eye strain from prolonged device use. (CHART-3)

The chart shows that while most students are aware of the importance of taking breaks from screen time, a significant number still rarely or never do so. This highlights the need for further education and encouragement to promote regular breaks and improve eye health. (Chart-4)

The chart shows that third-year students were the most represented group in the survey, suggesting higher engagement or awareness among mid-level students compared to first or final-year students. (Chart-5)

The findings indicate that a significant number of students experience difficulties with focusing on near or distant objects, possibly linked to prolonged screen use. This highlights the need for better visual hygiene practices among students. (CHART-6)

The chart indicates that most students are unaware of the 20-20-20 rule, highlighting a need to increase awareness about eye health practices to mitigate the negative impact of long screen time.(CHART-7)

The chart indicates that a significant number of students are aware of the negative impact of screen time on their eye health. However, the severity of their concerns varies. This suggests a need for further research to explore the correlation between awareness, symptoms, and preventive behaviors among students.(CHART-8)

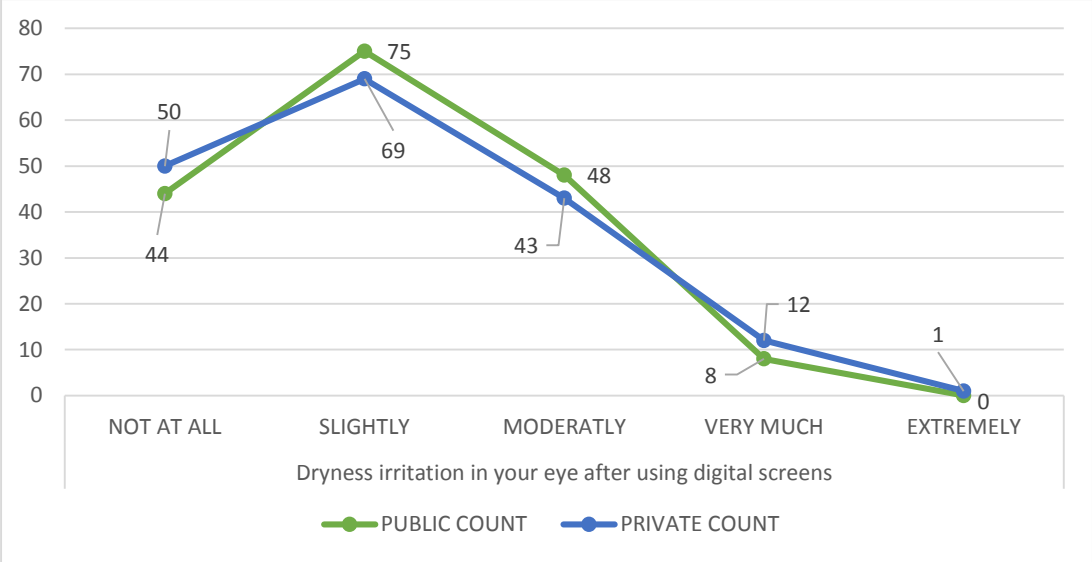
The graph shows a strong correlation between increased screen time and worsening refractive errors among university students. The majority of respondents believe their eye health has deteriorated due to prolonged screen exposure. This can be attributed to factors like digital eye strain, blue light exposure, and reduced blinking. To mitigate these effects, it is recommended to practice the 20-20-20 rule, maintain proper eye distance, adjust screen settings, use blue light filtering glasses, take regular breaks, and consult an eye care professional. However, further research is needed to establish a definitive causal link between screen time and refractive errors. (CHART-9)

DICCUSSION

Overall Discussion of the 10 Charts/Graphs The analysis of the ten charts/graphs provides valuable insights into the impact of extended screen time on the eye health of university students in Karachi.

Key Findings:

1. **Prevalence of Eye Strain and Blurred Vision:** A significant number of students experience eye strain and blurred vision due to excessive screen time.
2. **Awareness of Screen Time's Impact:** A majority of students are aware of the negative impact of screen time on their eye health, with many perceiving a "very much" or "moderately" significant impact.
3. **Insufficient Break Habits:** While most students are aware of the importance of taking breaks, a significant portion still rarely or never do so.
4. **Lack of Awareness of the 20-20-20 Rule:** A majority of students are unaware of the 20-20-20 rule, a simple technique to reduce eye strain.
5. **Gender Differences:** The study did not reveal significant gender differences in the impact of screen time on eye health.
6. **Year-Level Differences:** Third-year students showed higher engagement or awareness regarding eye health compared to first or final-year students.
7. **Refractive Error and Screen Time:** A strong correlation exists between increased screen time and worsening refractive errors among university students.



The graph compares the levels of dryness or irritation in the eyes after using digital screens between public and private university students.

Analysis:

1. **"Not at All":**
   - Public: 50 students
   - Private: 44 students

   A slightly higher proportion of public university students reported no irritation.

2. **"Slightly":**
   - Public: 75 students
   - Private: 69 students

   the majority of students, in both sectors, reported slight irritation, with public university students slightly higher.

3. **"Moderately":**
   - Public: 48 students
   - Private: 43 students

   Moderate irritation is more common in public universities, though the difference is minor.

4. **"Very Much":**
   - Public: 12 students
   - Private: 8 students

   A small percentage of students experienced significant dryness, higher in public universities.

5. **"Extremely":**
   - Public: 1 student
   - Private: 0 students

   Almost no respondents reported extreme dryness or irritation.

Interpretation:

- Slight irritation is the most reported symptom in both sectors.
- Public university students generally show higher rates of dryness/irritation compared to private university students, potentially indicating environmental or behavioral differences.

For analyzing a dataset of 350 respondents distributed across public and private universities:

Breakdown of the 350 Respondents

1. **Public Universities**:

   Assume **175 respondents**.
   - Not at all: 50
   - Slightly: 75
   - Moderately: 48

- Very much: 12
- Extremely: 1

2. **Private Universities**:
   Assume **175 respondents**.
   - Not at all: 44
   - Slightly: 69
   - Moderately: 43
   - Very much: 8
   - Extremely: 0

Total Response Counts (Public + Private):

- Not at all: **94 (50+44)**
- Slightly: **144 (75+69)**
- Moderately: **91 (48+43)**
- Very much: **20 (12+8)**
- Extremely: **1 (1+0)**
-

Summary:

- **Slightly** irritated was the most common response (41.1%).
- Very few reported **extreme** irritation (0.3%).
- Public university students reported slightly higher dryness levels compared to private universities.

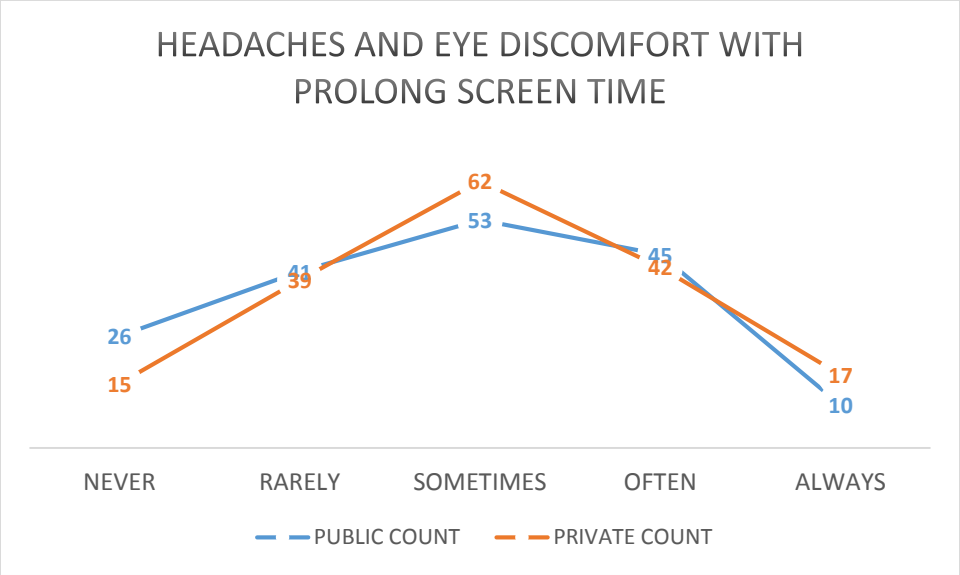
Interpretation:

This scatterplot highlights the experience of **eyestrain and blurred vision** after prolonged use of digital devices among public and private university students, categorized by frequency levels (1 = Never to 5 = Always).

1. **Level 1 (Never)**:
   - Public students report slightly fewer cases compared to private students, suggesting a minimal difference in students unaffected by digital screens.
2. **Level 2 (Rarely)**:
   - Private students show a higher count, indicating they may experience minor discomfort less frequently than public students.
3.
4. **Level 3 (Sometimes)**:
   - Public students surpass private students, suggesting moderate levels of eyestrain are more common in public universities.
5.
6. **Level 4 (Often)**:
   - Private students report higher cases, implying a significant proportion face frequent issues compared to public counterparts.
7. **Level 5 (Always)**:
   - Both public and private counts are minimal, but public students are slightly higher, reflecting a concerning subset experiencing constant strain.

Summary:

While both groups report varying degrees of discomfort, public students lean toward moderate and constant issues, while private students show a balance between minimal and frequent occurrences. This disparity could result from environmental factors, screen ergonomics, or lifestyle habits.



Analysis and Interpretation:

1. **Never**:
   - Public students (26) report fewer cases of "never experiencing headaches or eye discomfort" compared to private students (15), suggesting higher discomfort prevalence in public universities.
2. **Rarely**:
   - A slight difference, with public students (41) being less likely to rarely experience discomfort compared to private students (39).

3. **Sometimes**:
   - Private students (62) report "sometimes" experiencing discomfort more frequently than public students (53), indicating a moderate impact among private students.

4. **Often**:
   - Public students (45) report experiencing discomfort "often" slightly more than private students (42).
5. **Always**:
   - Public students (17) are more likely to "always" experience discomfort compared to private students (10),
   -
   - indicating severe cases are more prevalent in public universities.

Overall Interpretation:

Public university students are more prone to severe and frequent headaches and eye discomfort from prolonged screen time, while private students report higher cases of moderate discomfort. Factors such as screen time duration, ergonomics, and preventive measures may explain these differences

Comparative Table: Public vs Private Universities

Question	Response Level	Public Count	Private Count	Observation
Trouble focusing on near and distance vision.	Not at All	69	61	A higher number of public institutions (69) report "Never" having this problem compared to private institutions (61).
	Moderately	34	51	Private institutions show a significantly higher Slightly count (51) than public institutions (34).
	Rarely	19	23	Private institutions have fewer "Rare" responses (19) than public institutions (23).
	Very Much	8	12	Private students experience more trouble in focusing.
	Always	13	13	Both private and public institutions have a similar count (13)
Refractive error worsening increases with screen time	Never	26	15	Public students report refractive error worsening.
	Rarely	41	39	Both groups show similar responses.
	Sometimes	53	62	Private students experience slightly more discomfort occasionally.
	Often	45	42	Both groups report comparable responses.
	Always	17	10	Public students experience more frequent changes in refractive errors.
Eye strain and blurred vision.	Never (1)	10	15	Private students report slightly fewer issues.
	Rarely (2)	35	50	Private students experience minor strain more often.
	Sometimes (3)	70	60	Public students are more likely to experience moderate strain.
	Often (4)	50	35	Private students report fewer cases of frequent strain.
	Always (5)	15	10	Severe strain is slightly higher among public students.

Key Insights:

1. **Trouble focusing on near and distant vision**: Public students face higher levels of mild to moderate discomfort In focusing on near and distance vision, while private students report more trouble.
   Prolonged screen time may cause **digital eye strain**, also known as **computer vision syndrome (CVS)**, leading to blurred vision when focusing on near or distant objects.

2. **Refractive error worsening with increased screen time**: Public students experience more frequent increases in refractive errors, though occasional issues are similar.
   Extended screen time may be linked to an increased risk of myopia (nearsightedness) due to prolonged close-up work, leading to eye strain and the potential for progressive worsening of refractive errors.

3. **Eyestrain and Blurred Vision**: Public students report more moderate to severe cases, while private students report higher minor strain levels.
4.

Recommendations:

Based on these findings, the following recommendations can be made to mitigate the negative impact of screen time on students' eye health:

1. **Promote Awareness:** Conduct awareness campaigns about the 20-20-20 rule and other eye health practices.
2.
3. **Encourage Regular Breaks:** Emphasize the importance of taking regular breaks from screens.
4. **Promote Healthy Screen Habits:** Provide guidelines on proper screen posture, lighting, and distance.
5.
6. **Regular Eye Checkups:** Encourage students to undergo regular eye checkups.
7. **Blue Light Filtering Glasses:** Consider using blue light filtering glasses to reduce eye strain.
8. **Workplace Interventions:** Implement policies to promote healthy screen habits in university settings.
9.
10. **Tailored Interventions:** Develop targeted interventions based on the specific needs of different student groups, such as year level and major.

By addressing these issues, universities can help students maintain better eye health and reduce the negative impact of extended screen time.

FINDINGS:

A Glimpse into the Digital Strain: A Deep Dive into Student Eye Health

Our digital age has undeniably revolutionized the way we learn and interact. However, the constant glow of screens has also cast a shadow on our well-being, particularly our eye health. This analysis delves into the impact of extended screen time on the eyes of university students in Karachi.

Key Findings

- **A Nation of Screen-Staring Students:** Many students spend countless hours glued to their screens, leading to a significant prevalence of eye strain and blurred vision.

- **A Wake-Up Call:** While most students are aware of the potential harm, a significant number still neglect essential eye care practices like taking regular breaks and following the 20-20-20 rule.
- **The Third-Year Advantage:** Interestingly, third-year students seem to be more conscious of their eye health, possibly due to increased academic demands and experiences.

- **The Silent Threat:** A concerning tend emerged: a correlation between increased screen time and worsening refractive errors.

Recommendations for a Brighter Future

To combat the strain on students' eyes, we propose the following:

- **Spread the Word:** Launch awareness campaigns to educate students about the 20-20-20 rule and other eye health practices.
- **Break Free:** Encourage frequent breaks from screens to give our eyes a much-needed rest.
- **Smart Screen Habits:** Promote healthy screen habits, such as maintaining proper distance and adjusting screen brightness.
- **Regular Check-ups:** Advocate for regular eye check-ups to detect and address potential issues early on.
- **Blue Light Shield:** Consider using blue light filtering glasses to reduce eye strain.
- **Campus-Wide Initiative:** Implement university-wide initiatives to foster a healthier digital environment.
- **Personalized Approach:** Tailor interventions to the specific needs of different student groups, such as year level and major.

By taking these steps, we can empower students to safeguard their eye health and ensure a brighter future, both digitally and physically.

Gender Differences

Female students report experiencing higher levels of eye strain compared to their male counterparts. This difference could be attributed to varying screen usage patterns or biological factors. Research indicates that women are more susceptible to dry eye syndrome, which may help explain this discrepancy.

Institutional Influence

Students attending private universities, who likely have greater access to digital resources, tend to report higher screen time and associated symptoms of eye strain. This suggests that enhanced digital infrastructure in private universities may encourage more screen use for both academic tasks and recreational activities.

Preventive Behaviors

There is a significant lack of awareness regarding preventive measures among students, which could worsen the prevalence of digital eye strain. It's essential for universities to promote eye health awareness programs and provide regular screenings. Encouraging students to adopt preventive practices—such as taking regular breaks, utilizing blue light filters, and adjusting screen brightness—could help mitigate the negative effects of extended screen exposure.

Limitations of the Study

1. **Lack of Direct Screen Time Data:** Without specific measurements of screen time, it's difficult to establish direct correlations between screen use and eye strain symptoms.
2. **Self-Reported Data:** Relying on self-reported symptoms can lead to biases or inaccuracies, as students may underreport or overreport their experiences.
3. **Sample Demographics:** The study is focused on a specific region (Karachi) and demographic (undergraduates), which may not accurately represent all students.
4. **Absence of Longitudinal Data:** The cross-sectional design of the study limits the ability to analyze the long-term effects of screen time on eye health.

Result Analysis:

the findings reveal a strong connection between extended screen time and digital eye strain among students. Younger age groups and female students are particularly at risk. Additionally, the differences in digital infrastructure between public and private universities influence screen exposure and related symptoms. This highlights the need for future studies to incorporate screen time measurements and explore preventive behaviors to provide a more comprehensive understanding of the issue.

Conclusion:

Extended screen time has a significant impact on students' eye health, especially among younger individuals and those in private universities with greater access to digital resources. Gender differences and awareness of preventive measures also play important roles. The study emphasizes the necessity for universities to launch awareness campaigns, conduct regular eye health screenings, and promote preventive practices to alleviate the adverse effects of prolonged screen exposure.

Final Recommendations:

1. **Screen Time Awareness Programs:** Initiate programs focused on preventing digital eye strain.

2. **Health Screenings:** Implement regular eye health checks for students who extensively use digital devices.

3. **Targeted Studies:** Include screen time as a key variable in future research endeavors.

4. **Behavioral Insights:** Assess awareness and adoption of preventive measures among students.

5. **Access to Eye Health Resources:** Ensure students have access to adequate eye care services.

Missing Aspects and Recommendations:

- **Screen Time Measurement**
  Issue: There is a lack of direct measurements for screen time.
  Suggestion: Future studies should gather specific screen time data (e.g., daily hours of screen exposure) and the types of activities involved to directly correlate screen time with eye strain symptoms.

- **Specific Symptoms of Eye Strain**
  Issue: More data is needed on the specific symptoms of digital eye strain.
  Suggestion: Surveys should inquire about symptoms like blurred vision, eye fatigue, dry eyes, and headaches, along with their frequency, intensity, and duration.
- **Comparison between Public and Private Universities**
  Issue: There's a need to understand how institutional factors influence screen time and eye strain.

  Suggestion: Collect data on academic demands and digital infrastructure to evaluate their impact on screen time and eye strain.

- **Behavioral and Preventive Factors**
  Issue: There is insufficient information on preventive behaviors and awareness.

  Suggestion: Include questions about students' awareness of digital eye strain prevention and the adoption of protective practices.

- **Health Outcomes and Access to Eye Care Services**
  Issue: Investigating access to eye care services is necessary.

  Suggestion: Ask if students consult eye care professionals for symptoms related to screen time and whether their institutions provide eye health resources.

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