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A STUDY ON HEARING AND VISION PROBLEMS DUE TO EARPHONE USE AND MOBILE PHONE VIEWING AMONG COLLEGE STUDENTS IN MADURAI CITY

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Abstract

In the present digital era, mobile phones and earphones have become an inseparable part of students' daily lives. Although they provide convenience in communication, online learning, and entertainment, their excessive and unsafe use has led to growing health concerns. Prolonged earphone usage at high volumes has been linked to hearing-related problems such as tinnitus, discomfort, and partial hearing loss, while extended exposure to mobile phone screens results in vision-related issues such as eye strain, blurred vision, dryness, and headaches. This study was conducted among 100 college students in Madurai City to assess the prevalence and determinants of hearing and vision problems caused by earphone use and mobile phone viewing. A structured questionnaire was used to collect primary data, and secondary information was drawn from research articles, institutional reports, and public health databases. The data were analyzed using descriptive statistics, Garrett Ranking Analysis, correlation, regression, and ANOVA to identify significant risk factors and the influence of demographic variables. The findings of the study revealed that duration of earphone usage, volume level, and daily screen time are the most critical contributors to hearing and vision-related health issues. Regression results confirmed that age and gender significantly influence both vision problems and earphone-related problems, while year of study also plays an important

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role in earphone-related issues. However, the type of degree pursued was not found to be a major determinant. The study concludes that unsafe technology practices are strongly associated with rising health problems among college students, and there is an urgent need to create awareness about safe usage practices. This research provides valuable insights for educators, parents, and policymakers to design effective awareness programs, preventive strategies, and behavioral interventions that can minimize long-term health risks associated with digital device usage among youth.

Keywords: Earphone Usage; Hearing Problems; Vision Problems; Digital Eye Strain; Mobile Phone Viewing; College Students; Madurai City; Regression Analysis; Garrett Ranking; Technology and Health

Introduction

In today's digital age, the use of mobile phones and earphones has become an integral part of students' daily life. While these technologies provide convenience and entertainment, excessive and improper usage has raised significant health concerns, particularly among college students. Prolonged use of earphones can lead to hearing-related problems such as ear pain, tinnitus, and partial hearing loss, while extended mobile screen viewing contributes to vision-related issues such as eye strain, dryness, blurred vision, and headaches.

Globally, the World Health Organization (WHO) has reported that over 1.1 billion young people (aged 12–35 years) are at risk of hearing loss due to unsafe listening practices involving personal audio devices and exposure to loud sounds. In India, studies suggest that more than 36% of college students experience some form of hearing discomfort or temporary hearing threshold shifts due to earphone use. Similarly, vision problems associated with excessive mobile phone usage are on the rise. The All India Ophthalmological Society (AIOS) estimates that 30 to 40% of young adults report symptoms of digital eye strain or Computer Vision Syndrome (CVS) due to prolonged screen exposure. Among college students, nearly 45% report eye-related problems such as irritation, redness, and difficulty in focusing after long hours of mobile usage.

In the context of Madurai City, a growing educational hub in Tamil Nadu, the prevalence of such health issues among college students is particularly concerning. With increasing dependence on online learning platforms, social media, and entertainment, students are spending more hours with earphones plugged in and eyes glued to mobile screens. This trend emphasizes the urgent need to analyze the hearing and vision problems faced by students and the demographic factors influencing them.

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Therefore, this study titled "A Study on Hearing and Vision Problems Due to Earphone Use and Mobile Phone Viewing among College Students in Madurai City" seeks to identify the significant risk factors, demographic influences, and the extent of problems caused by modern technology usage among the youth. The findings will not only provide insights into the health implications but also help in creating awareness programs to promote safe usage practices among college students.

Review of Literature

In 2017, Basu et al. Highlighted the growing concern over personal audio device usage and its association with the risk of hearing loss, indicating that prolonged exposure to high sound levels could have detrimental effects on auditory health.

Moving forward, Reddy and Thenmozhi (2018) examined excessive headphone usage among college students and reported negative health effects, particularly concerning hearing issues and ear discomfort. Similarly, in 2019, a study titled Earphone usage and its implication on health among college going students emphasized the harmful consequences of overuse of earphones, reinforcing the trend of increasing health risks linked to these devices.

In 2021, Shrimal and Nandurkar investigated the relationship between self-reported hearing status and audiometric thresholds among students using headphones. Their findings revealed early signs of hearing impairment, stressing the need for awareness regarding safe listening practices.

By 2022, concerns expanded beyond hearing to include vision, as a study on headphone/earphone usage in Tamil Nadu observed broader health implications of device use. At the same time, Ragavan et al. (2022) assessed knowledge, attitude, and practice regarding digital eye strain (DES) prevention among medical students, revealing moderate awareness but inadequate preventive practices.

The year 2023 witnessed multiple contributions. Sharma et al. Identified key determinants of digital eye strain among university students, linking prolonged screen exposure with eye fatigue and discomfort. Balasubramanian et al. Supported these findings by framing DES as a growing public health concern. Likewise, Malik (2023) conducted a questionnaire-based study in Bihar, confirming the widespread prevalence of DES among medical students.

In 2024, research continued to emphasize both auditory and visual health. Kulkarni and Sreedevi reported a significant association between earphone usage and hearing loss among medical students. Shroff et al. Further examined digital eye strain among undergraduate medical students, confirming it as a common issue exacerbated by extensive screen exposure and digital dependency.

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Objectives of the Study

1. To study the prevalence and nature of hearing and vision problems result from earphone use and mobile phone viewing among college students in Madurai City.
2. To examine the most influential factors contributing to hearing and vision problems among college students use Garrett Ranking Analysis.
3. To analyze the impact of demographic factors on vision problems related to mobile phone viewing using Regression Analysis.
4. To analyze the impact of demographic factors on problems related to earphone use among college students using Regression Analysis.

Research Methodology

The present study adopts a descriptive analytical design to examine hearing problems due to earphone use and vision problems due to mobile phone viewing among college students in Madurai City. The design enables both description of prevalence and analytical testing of associations between usage behaviors and health outcomes. The study area is Madurai City, Tamil Nadu, chosen for its dense concentration of higher-education institutions and high digital-device penetration among youth.

The target population comprises undergraduate and postgraduate students enrolled in selected colleges within the city. A sample of 100 students was selected using stratified random sampling, ensuring representation across gender, degree stream (UG/PG), and year of study. This approach improves comparability across demographic strata while keeping the sample operationally feasible for in-depth analysis.

Primary data were collected through a structured questionnaire covering (i) demographics (age, gender, degree, year of study), (ii) earphone-use patterns (duration, volume, use during sleep, brand/quality), (iii) mobile-viewing patterns (daily screen time, viewing distance, low-light use), and (iv) self-reported outcomes (frequency of hearing issues and eye strain) with Likert-type scales. Secondary data were drawn from peer-reviewed articles, institutional reports, and public health sources to contextualize findings. Prior to the main survey, the instrument was pilot-tested for clarity and reliability; internal consistency was assessed using Cronbach's alpha (acceptable threshold ≥ 0.70). Data were coded and analyzed using SPSS. The analysis plan included descriptive statistics (mean, SD, percentages) to profile respondents; Garrett Ranking Analysis to prioritize perceived risk factors; and inferential techniques multiple regression to test the influence of demographics on (a) vision problems and (b) earphone-related problems, along with ANOVA for overall model significance and correlation analysis to examine bivariate associations. Ethical safeguards included informed consent, anonymity, and voluntary participation.

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No personally identifiable information was collected, and respondents could withdraw at any point without consequence. The scope is limited to college students in Madurai; findings may not generalize to other regions or age groups, and self-reporting may introduce recall or social-desirability bias.

Hypotheses for Vision Problems due to Mobile Phone viewing and Problems due to Earphone use

- H_0 (Null Hypothesis): Demographic factors (Age, Gender, Degree, and Year of Study) have no significant influence on vision problems due to mobile phone viewing among college students.
- H_1 (Alternative Hypothesis): Demographic factors (Age, Gender, Degree, and Year of Study) significantly influence vision problems due to mobile phone viewing among college students.
- H_0 (Null Hypothesis): Demographic factors (Age, Gender, Degree, and Year of Study) have no significant influence on problems due to earphone use among college students.
- H_1 (Alternative Hypothesis): Demographic factors (Age, Gender, Degree, and Year of Study) significantly influence problems due to earphone use among college students.

Analysis of Hearing and Vision Problems among College Students due to Earphone and Mobile Phone Usage

This section presents the analysis of data collected from 100 respondents in Madurai City. It highlights students' earphone usage patterns, mobile viewing habits, and their health implications. Garrett Ranking Analysis, Regression, Correlation, and ANOVA were applied for deeper insights. The results aim to identify significant factors contributing to hearing and vision problems.

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Table 1: Garrett Ranking Analysis of Factors Influencing Hearing and Vision Problems among College Students

Factors		Garrett Ranking Analysis										Total	Garret Score	Mean Score	Rank
		1	2	3	4	5	6	7	8	9	10				
		Garrett Rank Scale Value													
		82	70	63	57	52	47	42	37	30	19				
		(No. of Respondents)													
Duration of earphone usage	f	11	12	12	11	11	11	6	12	7	7	100	5253	52.530	1
	fx	902	840	756	627	572	517	252	444	210	133				
Volume level used	f	12	11	11	8	10	10	8	12	10	8	100	5125	51.250	2
	fx	984	770	693	456	520	470	336	444	300	152				
Daily mobile screen time	f	10	11	9	12	9	10	12	10	9	8	100	5075	50.750	3
	fx	820	770	567	684	468	470	504	370	270	152				
Viewing distance from mobile screen	f	8	9	10	10	10	11	11	9	12	10	100	4868	48.680	8
	fx	656	630	630	570	520	517	462	333	360	190				
Use of mobile in low-light conditions	f	9	10	11	11	9	12	9	8	10	11	100	4973	49.730	6
	fx	738	700	693	627	468	564	378	296	300	209				
Use of earphones during sleep	f	11	9	12	10	9	7	12	8	8	14	100	4961	49.610	7
	fx	902	630	756	570	468	329	504	296	240	266				
Quality or brand of earphones	f	9	7	10	6	11	11	11	12	12	11	100	4764	47.640	10
	fx	738	490	630	342	572	517	462	444	360	209				
Frequency of eye strain	f	9	11	9	9	11	12	10	11	9	9	100	4992	49.920	5
	fx	738	770	567	513	572	564	420	407	270	171				
Frequency of hearing issues (e.g., ringing, discomfort)	f	12	10	9	12	11	6	10	9	12	9	100	5073	50.730	4
	fx	984	700	567	684	572	282	420	333	360	171				
Awareness about safe tech use	f	9	10	7	11	9	10	11	9	11	13	100	4816	48.160	9
	fx	738	700	441	627	468	470	462	333	330	247				

Source: Computed, Note: f=No. of respondents; x=Scale Value; fx= Score

In the table 1 Garrett Ranking Analysis reveals that "Duration of Earphone Usage" ranks first with the highest mean score of 52.53, indicating that prolonged use of earphones is the most significant factor influencing hearing and vision-related problems among college students. The second most important factor is "Volume Level Used" (mean score 51.25), suggesting that listening at high volumes considerably contributes to hearing issues. Similarly, "Daily Mobile Screen Time" stands in third place (mean score 50.75), showing that excessive screen exposure strongly affects students' vision health. The factor "Frequency of Hearing Issues (e.g., ringing, discomfort)" is placed fourth (mean score 50.73), emphasizing that students are increasingly experiencing direct hearing problems due to earphone usage. "Frequency of Eye Strain" ranks fifth (mean score 49.92), highlighting that mobile screen viewing is a leading cause of visual discomfort. Other factors like "Use of Mobile in Low-Light Conditions" (mean score 49.73) and "Use of Earphones during Sleep" (mean score 49.61) also show notable influence, reflecting poor lifestyle habits. On the other hand, factors such as "Viewing Distance from Mobile Screen" (mean score 48.68),"Awareness about Safe Tech Use" (mean score 48.16), and "Quality or Brand of Earphones" (mean score 47.64) are ranked lower, suggesting that students either overlook these aspects or consider them less influential compared to duration and intensity

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of usage. Overall, the analysis indicates that excessive duration of earphone usage, high volume levels, and long hours of mobile screen exposure are the critical determinants of hearing and vision problems among college students in Madurai City.

Table 2: Regression Analysis of Demographic Factors Influencing Vision Problems due to Mobile Phone Viewing among College Students

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.886[a]	0.786	0.777	0.646	0.786	87.122	4	95	0.000

a. Predictors: (Constant), Year of Study, Degree, Age , Gender

ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	145.363	4	36.341		
Residual	39.627	95	0.417	87.122	0.000[b]
Total	184.990	99			

a. Dependent Variable: Vision Problems Due to Mobile Phone Viewing
b. Predictors: (Constant), Year of Study, Degree, Age , Gender

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-0.763	0.257	-	-2.966	0.004
Age	0.509	0.123	0.345	4.128	0.000
Gender	1.328	0.245	0.486	5.426	0.000
Degree	0.306	0.146	0.112	2.090	0.039
Year of Study	0.100	0.113	0.058	0.879	0.381

a. Dependent Variable: Vision Problems Due to Mobile Phone Viewing

In the table 2 regression analysis shows that the model is highly significant in explaining vision problems due to mobile phone viewing among college students. The R value (0.886) indicates a strong positive correlation between demographic factors and vision problems. The R Square value (0.786) reveals that about 78.6% of the variation in vision problems is explained by the predictors Age, Gender, Degree, and Year of Study. The ANOVA result ($F = 87.122$, Sig. = 0.000) confirms that the overall regression model is statistically significant. Among the predictors, Age ($\beta = 0.345$, Sig. = 0.000) and Gender ($\beta = 0.486$, Sig. = 0.000) are highly significant factors, showing that older students and gender differences strongly influence vision problems. Degree ($\beta = 0.112$, Sig. = 0.039) also has a significant but weaker impact. However, Year of Study ($\beta = 0.058$, Sig. = 0.381) is not statistically significant, implying that the academic year does not substantially affect vision problems. Overall, the results indicate that Age, Gender, and Degree are the key demographic determinants of vision problems due to mobile phone viewing, while Year of Study plays a minimal role.

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Table 3: Regression Analysis of Demographic Factors Influencing Problems Due to Earphone Use Among College Students

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.838[a]	0.701	0.689	0.817	0.701	55.790	4	95	0.000

a. Predictors: (Constant), Year of Study, Degree, Age , Gender

ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	148.951	4	37.238	55.790	0.000[b]
Residual	63.409	95	.667		
Total	212.360	99			

a. Dependent Variable: Problems Due to Earphone Use
b. Predictors: (Constant), Year of Study, Degree, Age , Gender

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.444	0.325	-	4.438	0.000
Age	1.922	0.156	1.216	12.322	0.000
Gender	-2.126	0.310	-0.726	-6.870	0.000
Degree	-0.199	0.185	-0.068	-1.073	0.286
Year of Study	0.440	0.143	0.240	3.072	0.003

a. Dependent Variable: Problems Due to Earphone Use

In the table 3 regression analysis shows that demographic factors significantly influence problems due to earphone use among college students. The R value (0.838) indicates a strong positive correlation, while the R Square value (0.701) reveals that 70.1% of the variation in earphone-related problems is explained by Age, Gender, Degree, and Year of Study. The ANOVA test (F = 55.790, Sig. = 0.000) confirms that the overall model is statistically significant. Among the predictors, Age (β = 1.216, Sig. = 0.000) is the most influential factor, indicating that older students tend to face more earphone-related problems. Gender (β = -0.726, Sig. = 0.000) also plays a significant role, suggesting notable differences between male and female students in experiencing earphone-related issues. Year of Study (β = 0.240, Sig. = 0.003) is also significant, showing that students in higher academic years are more prone to such problems. However, Degree (β = -0.068, Sig. = 0.286) is not statistically significant, meaning the type of degree pursued does not strongly affect earphone-related problems. Overall, the findings indicate that Age, Gender, and Year of Study are the key demographic factors influencing problems due to earphone use, while the type of degree has little effect.

Suggestions and Recommendations

1. Controlled Earphone Usage – Students should limit earphone use to less than one hour per day and keep the volume below 60% to prevent long-term hearing damage.
2. Safe Mobile Viewing Practices – Mobile screen time should be restricted, and the 20-20-20 rule.
3. Awareness Programs: Colleges should organize awareness campaigns,

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workshops, and seminars to educate students about the harmful effects of prolonged earphone use on hearing and vision.

4. Counseling Support: Counseling cells may provide guidance to students experiencing hearing discomfort, sleep disturbance, or concentration issues due to excessive earphone usage.

Conclusion

The study clearly establishes that prolonged earphone use and excessive mobile phone viewing contribute significantly to hearing and vision problems among college students in Madurai City. The Garrett Ranking Analysis highlighted duration of earphone usage, volume level, and daily screen time as the most critical factors affecting students' health. Regression analysis further revealed that age, gender, and degree of study have a significant influence on vision problems, while age, gender, and year of study strongly affect earphone-related problems. The findings confirm that unhealthy technology practices, such as listening to music at high volumes, extended earphone usage, and continuous mobile screen exposure, are directly linked to symptoms like ear discomfort, tinnitus, eye strain, blurred vision, and headaches. Despite awareness of risks, many students continue unsafe practices, reflecting a gap between knowledge and behavior. Overall, the study concludes that hearing and vision problems are emerging lifestyle-related health issues among college students due to increased reliance on digital devices. Immediate steps such as awareness creation, preventive practices, counseling support, and safe technology usage guidelines are necessary to protect students from long-term health consequences.

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