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Impact of Screen Time on Youth After Lockdown

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Objective-To record people's response on their screen time habits after lockdown.
Subject Name- Quantitative Techniques
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Questionnaire
1. On a scale of 1 to 5 how much has your screen time increased after lockdown?
2. What is your age ?
3. On a scale of 1 to 4, where 1 is "student", 2 is "professional/entrepreneur", 3 is "retired", and 4 is "homemaker",
4. what is your profession?
5. Which device do you primarily use? Rate from 1 to 3, where 1 is "Mobile Phone", 2 is "Tablet", and 3 is "Laptop/PC".
6. Rate the following in ascending order based on your screen time.(Lowest to Highest) [Social Media]
7. Rate the following in ascending order based on your screen time.(Lowest to Highest) [Gaming]
8. Rate the following in ascending order based on your screen time.(Lowest to Highest) [OTT]
9. Rate the following in ascending order based on your screen time.(Lowest to Highest) [Work]
10. How much time after waking up do you check your phone? Choose from the following options:
11. On a scale of 1 to 5 how much have your eyes been affected
12. How much have your sleeping pattern affected on a scale of 1 to 5?
13. On a scale of 1 to 5 , how much you perceive your mobile phone as a distraction?
14. How Frequently do you check your phones for notifications?
15. Rate your distraction level when you receive a notification
16. Has your productivity been affected due to your screen time?

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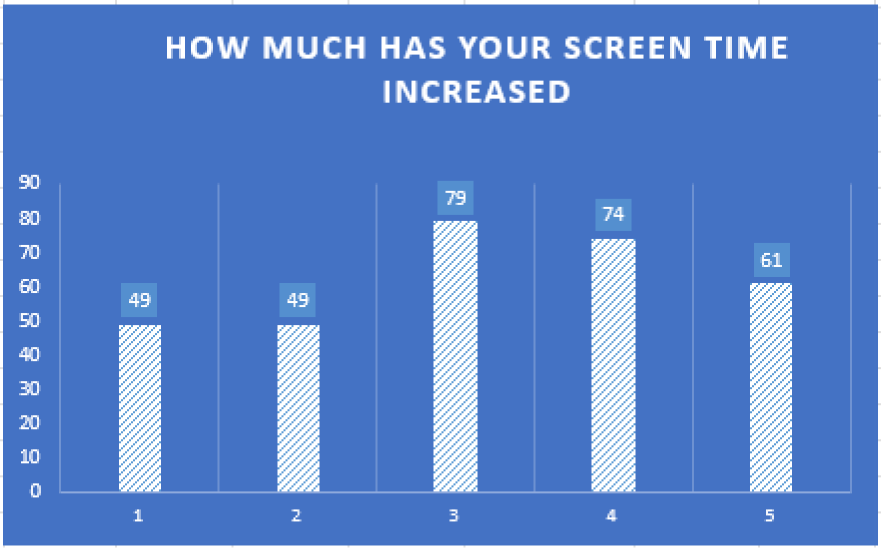
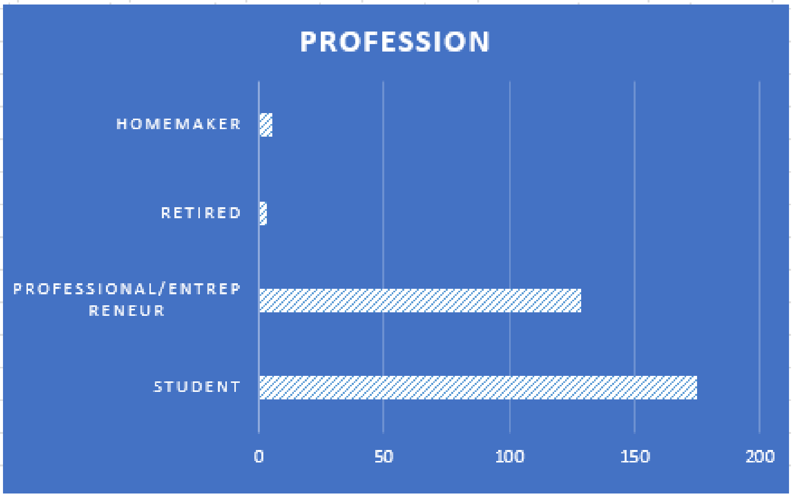
How much has your screen time increased	Frequency
1	49
2	49
3	79
4	74
5	61
Total	312

Histograms



- The graph shows the frequency distribution of how much screen time has increased over the past few months. The x-axis represents the increase in screen time in hours and the y-axis represents the frequency. For instance, 49 people experienced a 1 hour increase in screen time.
- The graph also shows that the average screen time has increased by 20% in the past few months. This is because the most frequent screen time increase (mode) falls at the 20% mark. There is also a relatively normal distribution of responses around the 20% mark, with some people experiencing lower increases and some experiencing higher increases.

What is your Profession	Frequency
Student	175
Professional/Entrepreneur	129
Retired	3
Homemaker	5
Total	312



The chart titled "Profession" displays the frequency of people in various professions. The professions listed are professional/entrepreneur, student, retired, and homemaker. There are 312 people included in the chart.

- Professional/Entrepreneur is the most frequent profession with 175 people.
- Student is the second most frequent profession at 129 people.
- There are significantly fewer retired people (3) and homemaker (5) compared to professional/entrepreneur and student.

Overall, the chart shows that professional/entrepreneurs and students make up the majority of the professions listed.

On a scale of 1 to 5 how much have your eyes been affected	
Mean	2.592948718
Standard Error	0.065264583
Median	3
Mode	3
Standard Deviation	1.152802383
Sample Variance	1.328953335
Kurtosis	-1.086062664
Skewness	0.069182087
Range	4
Minimum	1
Maximum	5
Sum	809
Count	312

Descriptive statistics
As with many other fields of science, descriptive statistics are used to describe and present the data. They become the means of highlighting and explaining the essential properties of the data, therefore letting us extract the real essence of all the given information and derive useful insights. Through descriptive statistics, we can reach the core features of information, we could find the patterns, and discover the trends would not be easy without the use of these data presentation tools.

through this descriptive kind of statistics, our goal is to help us to present and define the data in a digestible and understandable way. All these comprise to mean, median, and mode, which are all measures of central tendency and show us what central or typical values are in the dataset. Quasi-scattered measures such as the range, the variance, as well as the standard deviation, help us understand how the data is distributed. They give us the chance to glimpse the whole data's nature by showing its shape, signs of symmetry, and whether there are any outliers or online merks.

The main advantage of descriptive statistics lies in its utilization that allows to sum up a large volume of information in the form of charts, tables, and numbers.

- Consolidate the data and present the figures in an accessible format - Understand the trends, distribution, and underlying patterns - Guarantee the insights, effective decisions, and problem-solving - Propagate better understanding between experts as well as among the population - Be a stepping-stone to more advanced analysis.

OUR FINDINGS FROM THE TEST:

- **Central tendency:** The average person surveyed reported a value of 2.59 on a scale of 1 to 5 regarding how much their eyes were affected by various factors. The median is 3, which means that half of the people surveyed reported a value of 3 or less, and the other half reported a value of 3 or more.
- **Dispersion:** The standard deviation is 1.15, which tells us that the data points are spread out about 1.15 units from the mean. The range is 4, which means the data points cover a range of 4 on the scale.
- **Shape:** The kurtosis is -1.09, which is slightly negative. This suggests that the data may be flatter than a normal distribution, with fewer extreme values. The skewness is 0.07, which is very close to zero, so we can't really say the distribution is skewed left or right.
- **Other:** The survey included 312 participants.

Overall, the survey results suggest that on average, people's eyes were moderately affected by the factors we queried about in our survey. The data is fairly spread out, but there is no strong indication that the data is skewed in one direction or another.

Rate your distraction level when you receive a notification	
Mean	3.076923077
Standard Error	0.081981817
Median	3
Mode	5
Standard Deviation	1.448087603
Sample Variance	2.096957705
Kurtosis	-1.321456221
Skewness	-0.096596939
Range	4
Minimum	1
Maximum	5
Sum	960
Count	312

- **Central tendency:**
  - **Mean (3.08):** On average, people reported a distraction level slightly above "3" (moderately distracted) when receiving notifications.
  - **Median (3):** Half of the respondents rated their distraction level as 3 or below, and the other half rated it as 3 or above.
- **Dispersion:**
  - **Standard deviation (1.45):** There is a fair amount of variation in the responses. People's distraction levels ranged from 1 (not distracted at all) to 5 (extremely distracted).
  - **Range (4):** The data covers the entire range of the scale (1 to 5).
- **Shape:**
  - **Kurtosis (-1.32):** The distribution of responses is flatter than a normal bell curve, indicating there are fewer people reporting feeling extremely distracted (5) or not distracted at all (1). Most responses fall around the average (3).
  - **Skewness (-0.10):** The data appears fairly symmetrical. There's no significant bias towards people reporting higher or lower distraction levels.
- **Other:**
  - **Sample size (312):** This is a relatively good sample size for a survey, but a larger sample size might yield more reliable results.

Conclusion:
The survey results suggest that notifications are a moderate distraction for most people (average slightly above 3 on a 1-5 scale). There's a fair amount of variation, though, with some people finding them highly distracting and others not very distracting at all.

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Karl Pearson Correlation Coefficient

Karl Pearson's coefficient of correlation is defined as a linear correlation coefficient that falls in correlation.
the value range of -1 to +1. Value of -1 signifies strong negative correlation while +1 indicates strong positive

Standard Deviation(X)=	7.86
Standard Deviation(Y)=	1.15
Covariance(X,Y)=	0.46
Karl Pearson's Correlation Coefficient=	0.0505

There is a Positive relation between Age and Impact on Eyes.
So there is an impact on the eyes from the age

The Karl Pearson Correlation Coefficient is a statistical measure common everywhere that measures the linear relationship between two variables on a scale from -1 to 1. This method is undoubtedly a useful tool that allows for the assessment of the strength and direction of the correspondence between parameters which then is applied in sciences to receive valuable information and in business analytics to make proper forecasts. Through learning the practical use of the correlation coefficient, it can be possible for researchers and analysts to perceive the meaningful output and decode the coded data information.

Determination Linear Relationship Between Two Variable

The Karl Pearson Correlation Coefficient is superior to others in terms of situations when someone conducts an analysis or research and she/he needs to know the relationship between two continuous variables. It computes the correlation between changes in a dependent variable with a different independent variable. The coefficient mine goes from -1 to 1 when you mean to tell that -1 means perfect negative linear relation, 0 means no linear relationship and 1 is in the opposite direction as 0.

Identify Variables

Probably the vital step is specifying the variables you are going to correlate. The variables that are subject to fluctuation such as height, weight, and income should be measured on a continuous type of scale.

Calculate the Coefficient

Having identified all the variables, you can now use statistical software or a formula to calculate the Karl Pearson Correlation Coefficient value. This coefficient is considered due to the variation in the individual values as well as compared to their respective means.

Interpret the Results

The last step is to give the meaning of the correlation coefficient, so that one will discover if the relationship between the two variables is a strong one and whether the relation is linear or not.

Interpreting the Correlation Coefficient Value

Karl Pearson's Coefficient Correlation is not complete without interpreting the insights of the study. The practical meaning of this analysis arises from this part. The value of the coefficient can range from -1 to 1, and the interpretation of this value is as follows: The value of the coefficient can range from -1 to 1, and the interpretation of this value is as follows:

Positive Correlation

If a positive correlation coefficient falls between 0 and 1, it can be interpreted that a rise in one variable also leads to an increase in another variable. The greater the positive correlation the closer the coefficient to 1 if the output is 1.

Negative Correlation

The correlation coefficient (between -1 and 0) which means the higher values of any variable, the other variable tends to decrease. The closer the

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coefficient is to -1 and the stronger the negative correlation, the lower the slope.

No Correlation

A relation coefficient of 0 means that variables are not linearly related to each other and the terms are not dependent on each other.

By appreciating the determination of the correlation coefficient, scientists and analysts can get the answer on the essence of the connection between the variables entered into consideration. This answer can serve as the support of decision-making and testing of hypothesis and, as the foundation of further research.

OUR FINDINGS FROM THE ANALYSIS

- **Karl Pearson Correlation Coefficient (0.0505):** This value tells us there's a **very weak positive correlation** between age and the reported impact on eyes. While a positive correlation suggests that as age increases, the impact on eyes might also increase, the value being so close to zero means this connection is almost negligible.
- **Standard Deviation (Age: 7.86, Impact: 1.15):** The standard deviation tells us how spread out the data points are from the average. In this case, the much higher standard deviation for age (7.86 years) compared to impact (1.15) indicates there's a wider range of ages in the survey than there is variation in how people reported their eyes being affected.
- **Covariance (0.46):** Covariance confirms the weak positive correlation. A positive covariance supports the finding of a positive correlation coefficient. However, the small value (0.46) again emphasizes the weakness of the relationship.

Overall:

These statistical measures suggest that age, within the range of our survey participants, likely doesn't have a significant impact on how people perceive their eyes being affected by the factors we queried about. There might be other variables that have a stronger influence on eye health in this group.

Regression Statistics	
Multiple R	0.105867013
R Square	0.011207825
Adjusted R Square	0.008018172
Standard Error	1.310719463
Observations	312

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	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	3.416547922	0.216520667	15.77931555	1.39196E-41	2.990511914	3.84258393	2.990511914	3.84258393
X Variable 1	-0.017716002	0.009450977	-1.874515337	0.061799654	-0.036312179	0.000880175	-0.036312179	0.000880175

Regression analysis is one of the most effective tools, however, the assumptions behind the regression model play a modifying role in the sense that the results will be considered dependable. A regression diagnostic is a set of tools to check whether there are any model violations or any factors that forfeit from the model's assumptions. It encompasses undertaking linearity, homoscedasticity, normality, and independence checks for the residuals, discovering and fixing influential points, multicollinearity, and recognizing and addressing other possible challenges.

Residual Analysis

The main part of regression diagnostic is residual analysis which means the exploratory of the discrepancies among the actual values and the values calculated by the regression model. It is useful to let this particular task show up the skewness, heteroscedasticity, and outliers.

Assumption Checking

Regression models are intended to produce an equation that can be used to forecast a given data. Therefore, assumptions like the linearity, normality, and independence of the residuals are made. It involves checking and identifying the assumptions such as the normality of errors and the presence or absence of any violation that can challenge the credibility of the model's result.

Model Refinement

Therefore, the regression diagnostics may point out aspects that will be corrected by refining and modifying the regression model. Perhaps may be to change variables, or to add or remove predictors, moreover, could be also using more advanced regression models.

The chi-square test is one of the most applied statistical approaches, which enables researchers to check if there is a strong enough relationship between two categorical variables to be considered statistically significant. This has significant research potential universal enough to be utilized in areas like psychology and sociology, biology, and business that can reveal meaningful patterns and trends in data. It helps researchers to understand the chi-square test and lets them draw crucial conclusions and take decisions based on their research.

OUR FINDINGS FROM THE ANALYSIS:

- **Multiple R** is a measure of the correlation between the independent variable (age) and the dependent variable (sleep affected). In this case, the value of 0.1058 is very close to zero, which suggests a weak correlation.
- **R Square** is another metric for correlation and it is derived from the squared value of the multiple R. An R Square value of 0.0112, like the multiple R value, is very close to zero, again indicating a weak relationship.
- **Adjusted R Square** attempts to account for the number of independent variables in the model. It is slightly lower than R Square at 0.0080, which again suggests a weak relationship between age and sleep affected.
- **Standard Error** of 1.31 indicates the standard deviation of the residuals from the regression line. In other words, it reflects the average distance that the data points fall from the regression line.

Overall, the regression analysis suggests that there is no statistically significant relationship between a person's age and how much their sleep is affected on a scale of 1 to 5. It's important to note that a weak correlation doesn't necessarily mean no relationship exists, only that it's difficult to detect a pattern from the data.

Here are some additional points to consider:

- The data may not have captured a relevant age range. For instance, if the survey was only given to young adults, it may not show a relationship between age and sleep. Sleep patterns tend to change more significantly as people enter middle and old age.
- Other factors that may affect sleep were not taken into account in this analysis. These factors could include stress levels, caffeine intake, or health conditions.

CHI SQUARE TEST

Understanding the Chi-Square Distribution

A chi-square distribution is a key part of the chi-square test since it is the basis for the test statistics. It is a probability distribution that describes the behavior of the chi-square statistic. While chi-square is a short measure of discrepancy between the observed and expected frequencies in a dataset. The sort of chi-square distribution varies with the number of degrees of freedom that are usually determined from the number of classes occurring in the data. Finding the chi-distribution properties is a must thing for the chi-square result interpretation. The fact that familiarity is always positive, and as the degrees of freedom increase, the distribution becomes more symmetrical and bell-shaped, is a general statement about the distribution. Researchers test the hypothesis by calculating the chi-square statistic using the distribution of chi-square. This value then helps them in the decision to approach their findings' results as statistically significant.

Calculating the Chi-Square Statistic

Chi-square is a statistic that stands for the foundation of the chi-square test. It is worked out by summing up the squared deviations of the observed and the expected frequencies and further dividing by the expected frequencies. The formula for the chi-square statistic is: $\chi^2 = \Sigma$ (O - E)2 / E, being: χ^2 is the chi-square statistic O is the observed frequency E is the expected frequency Σ represents the sum of the values to calculate the chi-square statistic, the following steps are included:

Formulating the Hypothesis

Scientists need to specify null and alternate hypotheses and use the test results to properly assess the null hypothesis for the statistical significance of the observed effect.

The Degrees of Freedom is a delicate part of the method that depends mainly on the number of variables and possible developments of the model.

The number of degrees of freedom is determined by class distribution, in the data, and it influences the form of the chi-square distribution.

Computing the Expected Frequencies

The researcher supposes the expected frequencies in line with the assumed model, which represents the number of times the observed variables should relate if there were no changes in the relationship between the said variables.

Calculating the Chi-Square Statistic

Letting observed and theoretical frequency, the chi-square statistic is calculated using the formula defined in the given formula.

The chi-Square Test refers to the rendering of the test influences on the outcomes.

The translation of the outcome of chi-square test results to a meaningful result is a very essential stage in the analysis process. The basic understanding of this interpretation is the fact that the p-value (represented here as the probability of attaining the observed chi-square statistics or even more extreme values) is the factor that leads to the null hypothesis being accepted or rejected. If the p-value is smaller than the chosen significance level (mostly 0.05), the disallowable hypothesis can be denied, which shows that there is a statistically significant relationship between individuals. Alternately, in the event the p-value is larger than the significance level the null hypothesis is not rejected and therefore the investigated relationship is not proved. This serves as an additional piece of information as well, namely the size of the chi value. A larger Chi-square value usually denotes a stronger association between the variables under study, while a lower value is evidence of no association or weak relationship.

Interpreting the p-value.

By chi-square statistic or any more extreme values, the p-value refers to the probability of obtaining a result. If the p-value is higher than the accepted significance level, it is approved that the null hypothesis is rejected, suggesting the relationship between both independent and dependent variables is statistically significant.

Evaluation of Strengths of the Ties.

The chi-square value helps to see the extent and severity of the existing relationship between the independent and the dependent variables. In general, a bigger chi-square value shows a higher association, whereas, the lower c value makes the connection almost untrue.

Since the Degrees of Freedom are established, there is less probability of the traders to keep their trading positions for extended periods.

Therefore, these degrees of freedom should also be represented as independent from the chi-square distribution and the outcomes. When research happens the chi-square statistic needs to be evaluated taking into account the degrees of freedom.

Limitations and Considerations

While the chi-square test is a strong and relatively much-used statistical tool, it is suggested to be aware of its limitations and include certain factors if you want to justifiably interpret it. Independent assumption is another key limitation which presumes that the behaviour or observations in the data do not depend on any prior uncertainty. Violation of this principle might lead to rendered results and draw other conclusions. Also, the chi-square test is sensitive including to sample size. A great quantity of the data collected can produce statistically significant results even though the difference in observed and expected frequencies is not as clear, whereas a small amount of the data can lead to low power and become incapable of detecting real relationships. A chi-square test statistic is a very data-sensitive statistic, and thus chi-square test can be adversely affected by small cells having low expected frequencies. In cases such as this, the use of alternative statistics methods, for example, Fisher's exact test would be more rational.

By understanding the limitations and considerations of the chi-square test, researchers can ensure that they interpret the results accurately and draw valid conclusions from their data.

OBSERVED	1	2	3	4	5	TOTAL
1	25	21	44	46	32	168
2	23	21	32	26	27	129
3	1	0	1	1	0	3
4	0	0	2	1	2	5
TOTAL	49	42	79	74	61	305

EXPECTED	1	2	3	4	5	TOTAL
1	26.99016	23.13443	43.51475	40.76066	33.6	168
2	20.72459	17.76393	33.41311	31.29836	25.8	129
3	0.481967	0.413115	0.777049	0.727869	0.6	3
4	0.803279	0.688525	1.295082	1.213115	1	5
TOTAL	49	42	79	74	61	305

International Journal of Humanities Social Science and Management (IJHSSM)
Volume 4, Issue 2, Mar.-Apr., 2024, pp: 1471-1480 www.ijhssm.org

TEST STATISTIC	1	2	3	4	5	TOTAL
1	0.146748	0.196926	0.005411	0.673461	0.07619	
2	0.249824	0.589516	0.059764	0.896936	0.055814	
3	0.556797	0.413115	0.063969	0.101743	0.6	
4	0.803279	0.688525	0.38369	0.037439	1	
TOTAL						7.599146

Significance level	5%
Degrees Of Freedom	12
Test Statistic	7.599146
p-Value	81.562%
Critical Value	21.02607

Check:	
p-Value	81.562%
Test Statistic	7.599146

OUR FINDINGS:

- **Observed vs Expected:** The table compares the observed values (how many people fell into each category) with the expected values (how many people we would expect to fall into each category if there were no relationship between profession and screen time). There are deviations between the observed and expected values in most categories, however it's not entirely consistent across all professions or screen time levels.
- **Chi-Square Test Statistic:** The Chi-Square test statistic is 7.599146. This statistic is used to assess how likely it is that the observed distribution of data could have occurred by random chance. A higher Chi-Square statistic indicates a lower probability that the observed pattern is random.
- **Significance Level:** The significance level is set at 5%. This means that if the Chi-Square statistic is greater than the critical value from the chi-square distribution table for a certain number of degrees of freedom, we can reject the null hypothesis (that there is no relationship between profession and screen time) at the 5% significance level.
- **P-Value:** The p-value associated with the Chi-Square test statistic is 81.562%. A high p-value (greater than 0.05) suggests that we fail to reject the null hypothesis. In other words, at the 5% significance level, there is not enough evidence to conclude that there is a statistically significant relationship between profession and screen time based on this data.

Here are some additional considerations:

- **Small Sample Size:** The sample size (total of 305 participants) may not be large enough to detect a statistically significant relationship, especially for some professions where the number of participants is much smaller (e.g. retired).
- **Other Factors:** The survey only considers profession as a factor affecting screen time increase. Other factors, such as age, living situation or pre-existing screen time habits, could also play a role.

While the data doesn't provide a statistically significant relationship between profession and screen time use, there are trends worth noting:

- **Entrepreneurs and Homemakers:** Entrepreneurs and homemakers appear to have reported the highest increases in screen time after lockdown, with both groups having the highest observed values in the "4" and "5" screen time increase categories.
- **Students:** Students seem to have reported the lowest increases in screen time on average.