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Screen use time and its association with mental health issues in young adults in India: A cross-sectional study of crowdsourced online sample

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Screen use time and its association with mental health issues in young adults in India: A cross-sectional study of crowdsourced online sample

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Abstract

Background: Screen use time has increased in the past decade owing to the increased availability and accessibility of electronic devices and the internet. Several studies have shown an association between increased screen use time and mental health issues like anxiety and depression. However, screen use is vital to modern life. It thus becomes pertinent to establish thresholds for screen use time to protect one's mental well-being.

Objective: We aim to measure the self-reported screen use times and patterns in young adults (18-24 years) in India, study the hypothesis that increased screen use time is associated with poorer mental well-being, and establish thresholds for 'safe' screen exposure time.

Methods: This protocol describes a cross-sectional study of a pan-India online convenience sample of young adults that have access to digital devices with a screen and a minimum of secondary school education. Participants will be recruited through a network of collaborators via social media while data will be collected through Google forms. Socio-demographic details will be collected through a questionnaire designed by the authors; screen use time and patterns will be assessed using an adaptation of the screen time questionnaire to include data on different applications and websites used on electronic devices; while mental health parameters will be gauged using the Warwick-Edinburgh mental well-being scale, Generalized Anxiety Disorder (GAD)-7, Perceived Stress Scale (PSS)-10, and Patient Health Questionnaire (PHQ)-9. To quantify the association between the screen use time with mental health, a Bayesian multivariate multiple regression analysis will be performed which models the possibility of multiple alternative hypotheses while accounting for relevant socio-demographic covariables.

Results: We have designed the questionnaire (survey instrument) and have received feedback from domain experts. We have not yet initiated the data collection and the results obtained will be updated accordingly.

Conclusions: This study could help better understand the role of screen time use on mental health, and determine the healthy levels of use in India, where the largest young adult population resides.

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Abstract

Background: Screen use time has increased in the past decade owing to the increased availability and accessibility of electronic devices and the internet. Several studies have shown an association between increased screen use time and mental health issues like anxiety and depression. However, studies in the young adult population - the demographic with high screen use, and that in low- and middle-income country settings are limited.

Objective: The protocol describes the study that aims to measure self-reported screen use times and patterns in young adults (18-24 years) in India and assess if increased screen use time is associated with poorer mental well-being.

Methods: This protocol describes a cross-sectional study of a pan-India online convenience sample of young adults (18-24 years) with access to digital devices with a screen and a minimum of secondary school education. Participants will be recruited through people in the professional networks of investigators which includes pediatricians. The survey will also be distributed via social media pages of our organization (Twitter, Instagram, Facebook, etc.). Socio-demographic details will be collected through a questionnaire designed by the authors, screen use time and patterns will be assessed using an adaptation of the screen time questionnaire to include data on different applications and websites used on electronic devices; while mental health parameters will be gauged using the Warwick-Edinburgh mental well-being scale, Generalized Anxiety Disorder (GAD)-7, Perceived Stress Scale (PSS)-10, and Patient Health Questionnaire (PHQ)-9. For statistical analysis, we will be considering the following variables: primary independent variable screen use time. Other independent variables include Age [A], Gender [G], Residence-Rural/Urban [R], Educational qualifications [E], Employment status [EM], stress associated with familial financial status [S], average sleep time [SL], number of people living in a house/rooms in that house [P], Body Mass Index [BMI], substance use [SU], and past psychiatric history [PPH]. Dependent variables include mental well-being [MWB], Depression [DEP], Anxiety [ANX], and Perceived stress [PS]. To quantify the association between screen use time and mental health, a Bayesian multivariate multiple regression analysis will be performed which models the possibility of multiple alternative hypotheses while accounting for relevant socio-demographic covariables.

Results: The survey instrument has been designed and feedback has been obtained from the domain experts and members of our organization whose profile is similar to the potential study participants. The final data received after the study is conducted will be analyzed and shared.

Conclusions: Based on the findings of this study, we will be able to establish a correlation between device and use-specific screen use time and various mental health parameters. This will provide a direction to develop screen use time and mental health guidelines among young adults.

Introduction

Screen use time has steadily increased in the 21st century with increased availability of and easy accessibility to electronic/digital devices and the internet (1). Adults and even children spend a large portion of their days on different screen-bearing devices including smartphones, tablets, laptops, computers, televisions, etc. (1). The recommended screen use time limit is considered to be 2h/day (2). However, studies have shown that screen use time has increased to as much as 7h/day in age groups 8-18 years in the US (3). As screens become increasingly integral to peoples' social and professional lives, there is a rise in health-related concerns. Previous studies conducted in the US and China have shown that increased screen use time has been associated with physical and mental health issues including increased incidence of anxiety and depression (2,4–6), sleep problems, and obesity (7). Further, screen use times have only increased during the COVID-19 pandemic making the issue a greater health research priority (8).

In 2021, the number of smartphone users in India reached 492.78 million which accounts for about 16.93% of the total users worldwide (9). Hence, it is timely to conduct studies to evaluate screen use time and its effects in low- and middle-income countries (LMICs) like India with an increasing number of screens and large young (emerging) adult populations. Previously, screen use and its health impacts have been studied across multiple countries including the US, China, and Canada. These studies have found the average daily screen use times to be between 1.73 h on weekdays, and 2.52 (1.49) on weekends among children (mean age 7.4 years) in Australia which is higher than the recommended screen use time per Australian Government guidelines. The guidelines suggest a screen use time of less than an hour for toddlers and preschoolers (10). In Canada, the average screen use time was 1.78±1.52 h/day among adults. This study aimed to study the association between sedentary screen use time and neighborhood walkability, which showed that higher screen use time was found in individuals who did not have access to walkable neighborhoods (11). The association between depression and screen use time is known to exist in different populations. For example, a study with college students in China has noted that the odds of depression were 1.76 times greater among those with over 2 h of daily screen use time compared to those with lower use times (6). Similarly, a study in Canadian youth found a significant correlation ($R=0.212$, $p<0.01$) between sedentary total screen use time and depression severity (2). Studies in India have focused on measuring screen use time and its correlation with various demographic factors, sleep problems, and mental health issues like depression among adolescents (12, 13). Screen use time in children under 5 has been studied to assess its association with developmental delay (14). These studies however do not use comprehensive activity-based screen use time. They also do not include the use of multiple mental health screening tools.

This study aims to measure the time spent on and patterns of screen use in individuals 18-24 years living in India. The study will probe into the different types of screen use-related factors such as types of devices, time and quality of engagement, and purpose of use. Young adults are of particular

interest as behaviors adopted during developing years can persist and develop into chronic diseases (4,6). This study includes a compilation of various existing mental health screening tools, which will help identify the presence of anxiety, depression, and stress. The hypothesis that increased screen use time is associated with various mental health problems including overall mental well-being, depression, anxiety, and perceived stress will be tested, while controlling for a wide range of possible confounders. A study like this with a comprehensive screen use time use scale for different devices and compilation of multiple mental health screening tools has not been conducted in India before. It could provide valuable data to help understand the public health impact and design preventive strategies for mental health issues due to increased screen use.

Methods

Ethics Information

The study will adhere to ethics regulations that are standard for non-interventional studies involving human participants in India. Ethics committee approval was obtained from the National Institute of Ayurveda, Jaipur, Rajasthan, India on September 1, 2021 (Ethics Committee Approval No. IEC/ACA/2021/02-12) under Dr. Nisha Ojha affiliated with the Department of Kaumarbhritya-Balroga, National Institute of Ayurveda, Jaipur, Rajasthan, India. The approval has been signed by the Institutional Ethics Committee member secretary Dr. Sumit Nathani (Associate Professor, National Institute of Ayurveda, Jaipur). Given that the study involves online data collection and storage, special attention will be given to data confidentiality and security. The confidentiality of each participant will be maintained throughout the study period as access to the raw data on participants will be available only to the members of the study team. Further, The questionnaire will not have any personal identifiers (name and date of birth) that would reveal the identity of the participants. The responses generated will be automatically transferred to a datasheet stored in the cloud-based service - Google Drive (a third-party trusted and commonly used data storage platform) owned by the Association for Socially Applicable Research (ASAR) admin account and can be accessed only by the study team members.

Pilot Data

No pilot data has been collected till now.

Design

Recruitment and Data Collection

This will be a cross-sectional online survey study conducted using a pan-India convenience sample. Participants will be recruited by investigators and people in their peer and professional networks. Additionally, the survey will be distributed through social media platforms that are popular in India such as WhatsApp, Facebook, Instagram, Twitter, etc. The survey will be posted on ASAR social media channels and those of collaborators regularly every two weeks for six months. The frequency will be adjusted based on the number of participants recruited in each such round. Concurrently, the social media channels will be modified and other online channels of dissemination will be explored. The survey will also be sent via email and text messaging by investigators to people in their peer and professional networks. Our investigators are located in different regions in India which will ensure nationwide coverage. A snowballing strategy will be used. Participants who have responded to the survey and people in the investigators' networks will be requested to send the survey instrument further to people who might be eligible for study participation. Additionally, the survey will also be distributed through the higher education institutes that investigators routinely collaborate with.

The survey will be distributed in the form of Google Forms. Participants are expected to take about 10-15 minutes to fill up the entire questionnaire. Once started, the participants will be able to resume the survey at any point later on, but we will recommend completing the survey in one week. Reminder emails will not be sent as the email IDs will be kept confidential. Additionally, participants will be directed to upload screenshots of their screen use time from their phones to assess objectivity. A step-by-step guide on how to upload the screenshot will be included in the questionnaire.

Data collection will be conducted for 12 months with the form being live for this duration. Eventually, survey data will be transferred to an external hard drive owned by the Association for Socially Applicable Research (ASAR) whose access is restricted to study investigators.

Inclusion/Exclusion Criteria

Participants for this study will be young adults from India from the age group of 18-24 years who have access to electronic/digital devices with a screen (television, personal computer, laptop, tablet, or smartphone), those who have completed secondary school (10th standard passed), and those who have the basic knowledge of English reading and writing. Individuals below 18 years of age and above 25 years of age will be excluded. Individuals who do not currently reside in India and have not resided in the last 12 months in the country, individuals not having access to electronic devices with a screen and those who have less than a secondary school education or have failed the 10th standard will be excluded.

Survey Instrument

All the survey questions will be marked compulsory in the Google Form to avoid incomplete entries. The questionnaire consists of 114 questions across four parts. First, the introduction of the study and consent form for the participants. Second, demographic and baseline details including age, gender, residence (rural/urban), State, educational qualifications, employment status, the stress associated with familial financial status, average sleep time, number of people living in a house/rooms in that house, body mass index (BMI), substance use, and past psychiatric history. This part of the study has been designed by the investigators, in line with other questionnaire-based surveys. Third, screen use time questionnaire (15). The questionnaire from the cited study takes into consideration two types of screen use times. First, screen use time is the primary activity which is defined as the main activity you are engaged in rather than using a television/other screens in the background while performing another activity such as cooking or exercising. Second, background screen use time is defined as the use of a television or another screen near you while performing other activities such as exercising, cooking, and interacting with family/friends. To get an accurate estimate of screen use time we have modified the questionnaire by adding questions to measure differential screen use time. This will be measured by asking participants to enter the number of hours and minutes spent on screen-bearing devices (eg. TVs, mobile phones, laptops, etc.) on various activities like entertainment (eg. Netflix, Amazon Prime, Youtube, etc.), gaming, social media (eg. Whatsapp, Facebook, Twitter, etc.), online classes/learning, shopping websites (eg. Amazon, Myntra, etc.). Fourth, mental health screening tools for well-being, depression, anxiety, and stress. Existing mental health screening tools will be used as they are without any modification (16).Warwick-Edinburgh mental well-being scale (17) will be used to assess mental well-being. This is a 14-item self-administered questionnaire where each item is scored from 1 to 5 with a total score of 70. The interpretation of the scoring will be done according to the guidelines set by the National

Health System (NHS) (18). Patient Health Questionnaire (PHQ-9) will be used to assess the presence and severity of depression. This is a 9-item self-administered questionnaire, where each question is scored from 0 to 3. PHQ-9 scores of 5, 10, 15, and 20 represent the presence of mild, moderate, moderately severe, and severe depression (19). The Generalized Anxiety Disorder (GAD-7) scale will be used to screen for the presence and severity of anxiety. This is a 7-item self-administered questionnaire where each question is scored from 0 to 3. Scores of 5, 10, and 15 represent mild, moderate, and severe anxiety (20). The Perceived Stress Scale (PSS-10) (21) will be used to assess the perception of stress in an individual. It is a 10-item self-administered scale, where each item is scored from 0 to 4. Scores from 0-13 are considered low perceived stress. Scores from 14-26 are considered moderate stress. Scores from 27-40 are considered high perceived stress. At the end of the questionnaire, participants will be provided with mental health resources such as helplines, emergency numbers, etc.

The survey is coded using Google Forms. The questionnaires included in the survey have been reviewed by a psychiatrist and a psychologist. The first three parts of the survey have been adapted as per the feedback from ASAR members, who match the profile of the eligible participant population, and also guided the adaptation process. A copy of the survey instrument is presented in the Supplementary Information.

Statistical Analysis

Research Question and Hypothesis Testing

Our main research question is whether screen use time is associated with mental health issues such as mental well-being, depression, anxiety, and perceived stress. Before stating our formal hypotheses, we present the list of independent and dependent variables and their abbreviations that will be referred to in this section.

The primary independent variable or predictor is screen use time [T] which will be calculated per individual for the full week (5 weekdays, 5 weeknights, and 2 weekend days) as 5 x ($T_{\text{per weekday}}$ + $T_{\text{per weeknight}}$) + 2 x ($T_{\text{per weekend day}}$) in minutes.) Other independent variables include age [A], gender [G], residence (rural/urban) [R], educational qualifications [E], employment status [EM], financial status [S], average sleep time [SL], number of people living in a house/rooms in that house [P], body mass index [BMI], history of substance use [SU], and past psychiatric history [PPH]. The outcomes or dependent variables will include mental well-being [MWB], depression [DEP], anxiety [ANX], and perceived stress [PS] as measured by the mental health screening tools mentioned above. Our null hypothesis is that there is no association between screen use time [T] and mental health issues [MWB, DEP, ANX, PS] i.e.

H0: [MWB, DEP, ANX, PS] ~ 1

Contrary to having a single alternative hypothesis in the frequentist approach, the Bayesian approach allows for probability distributions for multiple competing alternative hypotheses. Therefore, we aim to test the influence of all the above-mentioned independent variables on the dependent variables through the following alternative hypotheses:

H1: [MWB, DEP, ANX, PS] ~ T

H2: [MWB, DEP, ANX, PS] ~ T + A

H3: [MWB, DEP, ANX, PS] ~ T + A + G

H4: [MWB, DEP, ANX, PS] ~ T + A + G + R

H5: [MWB, DEP, ANX, PS] ~ T + A + G + R + E

H6: [MWB, DEP, ANX, PS] ~ T + A + G + R + E + EM

H7: [MWB, DEP, ANX, PS] ~ T + A + G + R + E + EM + S

H8: [MWB, DEP, ANX, PS] ~ T + A + G + R + E + EM + S + SL + P

H9: [MWB, DEP, ANX, PS] ~ T + A + G + R + E + EM + S + SL + P + BMI

H10: [MWB, DEP, ANX, PS] ~ T + A + G + R + E + EM + S + SL + P + BMI + SU

H11: [MWB, DEP, ANX, PS] ~ T + A + G + R + E + EM + S + SL + P + BMI + SU + PPH

Sampling plan

We plan to perform a Sequential Bayes Factor Design Analysis (SBFDA). Since the study does not use the traditional Frequentist Null Hypothesis Testing, there is no need to determine the power or minimum sample size a priori. We will start with initial design priors for the variables, draw an initial sample size of N_{eff}, and calculate the Bayes factor for the alternative models relative to the null model. We will then sequentially increase our sample size until the Bayes factor (relative to the null model, BF_{10}) for the best-fit model i.e. the model with the highest posterior probability becomes greater than or equal to 30. Obtaining a $BF_{10} \geq 30$ would imply that screen use time is strongly correlated with mental health issues with a high posterior probability. Data collection will be continued till the end of 12 months. No optional stopping rule is required as it has been previously argued that under Bayesian formalism the strength of the evidence is not associated with the decision to terminate data collection (22).

Analysis plan

To ensure high data quality, we will employ some basic exclusion checks before the analysis. The entire response entry (i.e., participant) with at least one missing variable from any of the dependent and primary independent variables will be excluded. We will also exclude the responses which give entries with unrealistic screen use time (T), for example, exceeding 24 hours per day. Data collection for different variables will be done in such a way that the candidates will have to fill in all the answers or choose out of multiple options provided. This would be useful for avoiding incomplete or missing data. The screenshots containing screen use time uploaded by the participants will be used as a secondary screen to further exclude the responses which are unrealistic.

Bayesian multivariate multiple regression analysis will be performed. The list of independent and dependent variables is provided under hypothesis testing. Before conducting the analysis, it has been assumed that the independent variables are not correlated with each other. After receiving the data from the survey, a correlation analysis between all the covariables will be performed first. The independent variables or covariables that have a strong correlation (Pearson r=0.7-1.0) with the primary independent variable will be dropped to reduce model complexity.

A default prior (Normal distribution) from the R-studio package ‘rstanarm’ will be used, which is weakly informative (23), i.e., the prior distribution is scaled based on the actual range of the

dependent variables, and this will reduce the uncertainties in the posterior probabilities. Therefore, the analysis will be started with default priors with subsequent adjustments to the distributions as per the data requirements. The other backup prior that could be used is the standard Jeffreys-Zellner-Siow (JZS) prior which follows a Cauchy distribution and can model skewed real-world associations better.

After the prior distributions are finalized, there are two methods. First, these priors will be used to initialize the Bayesian multi-model inference using linear regression based on the Bayesian adaptive sampling methodology (24). This methodology can be applied through a graphical interface tool, JASP which is based on the BAS package in R. This will enable prediction of the plausibility of each model, based on their posterior probability distributions. The Bayes factor for a particular model will be finally computed using this posterior probability relative to the posterior probability of the null model. Second, stan_glm function in rstanarm can be continued to fit Bayesian generalized linear regression models. This package follows a Markov Chain Monte Carlo (MCMC) technique to explore a desired posterior probability distribution. The advantage of using rstanarm is that it fits a wider range of models as compared to JASP.

Results

The survey instrument has been created by designing a demographic questionnaire, compiling various existing mental health screening tools, and adapting an existing screen use time questionnaire. The instrument was reviewed by domain experts for feedback. Ethics committee approval has been obtained. The study will be funded by the National Institute of Ayurveda, Jaipur, India. As of January 2023, we have not yet initiated the data collection and the results obtained will be updated in this section accordingly.

Discussion

Principal Findings

This study aims to find the presence and magnitude of the association of screen use time used for different activities like education, social media, online shopping, and entertainment with depression, anxiety, perceived stress, and general mental well-being while adjusting for confounders. We hypothesize that there is a positive correlation between screen use time and mental health issues like depression, anxiety, and high levels of perceived stress. There is some support for this hypothesis from existing studies across different study populations and age groups.

Comparison to Prior Work

A meta-analysis including 16 studies done in North America, Australia, and countries in Asia and Europe; and the age group of 5-18 years shows a curvilinear dose-response between screen use time and the risk of depression with or with increasing screen use time per day (3). A study conducted in India among 16,292 adolescents and young adults in the age group of 10-19 years to examine the association between screen use time and sleep problems showed that screen use time increased with increasing age; with average screen use time being about 25 minutes per day for 12 years old males and females to about 150 minutes per day in males and 50-100 minutes per day in females of age 23 years (13). A study involving 380 undergraduate college students in India showed that students with internet addiction (measured by Young's Internet Addiction Test) had significantly higher depression, anxiety, and stress than those without internet addiction (25). A community-based study with participants in the 10-19 years age group in India found that the mean screen use time was 3.8 hours on weekdays and 3.9 hours on weekends (12). This study also showed that there

has been an increase in the use of electronic devices apart from television like mobile phones.

A meta-analysis including a total of 19 studies from the USA, Australia, Singapore, Sweden, China, Brazil, Ghana, India, South Korea, Russia, and Mexico showed an odds ratio of 1.28 between screen use time-based sedentary behavior and depression (2). A systematic review of reviews in the age group of under 3 years which included a total of 29 studies from the US, countries in Europe, and Asia showed that high screen use time is associated with low measured health-related quality of life (HRQOL) and higher depressive symptoms (26). A study establishing a relationship between screen use time, physical activity, and obesity in adolescents in the US showed high predicted obesity incidence was associated with high screen use time (27). A prospective study done in Denmark in 435 adolescents who were followed up for a period of 12 years showed each additional hour per day spent watching television or screen viewing was associated with 1.64 (95% CI 1.18–2.27) and 1.58 (95% CI 1.18–2.12), respectively, greater odds of prevalent depression in young adulthood, and dose–response relationships were indicated (28). A study among 926 US adults found that there were significant associations (X^2 = 14.96, p<0.001) for heavy (median time - 17.5 hours per day) and moderate (median time - 11.25 hours per day) screen use with BMI compared to light (median screen use time - 7 h) use (7). Relation between device-specific screen use time and health-related behavior has been studied by Vizcaino et al which shows heavy users (17.5 hours per day) have the highest perceived stress scores (7).

Strengths and Limitations

While studies showing a correlation between screen use time and mental health have been conducted, the strength of this study is that it studies device-specific screen use time and its relation with depression, anxiety, and perceived stress. The correlation between activity-specific screen use time and the mentioned mental health parameters will also be studied.

The study has the following limitations. First, the study uses a self-reported questionnaire due to which there might be some self-reporting bias. The questionnaire includes questions that ask the participants to recollect information based on their past experiences due to which there could also be recall bias. We are applying a secondary screen by asking participants to upload a screenshot of the screen use time settings on their phones. Since this question is not compulsory, all the participants might not upload it.

Future Directions

The exponential rise in screen use time warrants further investigation of its effect on mental health. Studies done in India focus largely on adults and adolescents. The age group that will be studied in this protocol is unique. The findings of this protocol could be used to establish healthy activity-based screen use time. Strategies and guidelines for the prevention of mental health disorders can be established.

Conclusion

This will summarize the principal findings and potential significance of the study.

Data Availability

Not applicable.

Code Availability

All analytical code will be shared upon acceptance of Stage 2 of the manuscript in the form of a GitHub repository.

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Formal Analysis: SZ, AM
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Competing Interests
None of the authors have conflicting interests to report.

Tables
Table 1. Design table for the study plan.

Question	Hypothesis	Sampling plan (e.g. power analysis)	Analysis Plan	Interpretation given to different outcomes
Is screen use time associated with mental health disorders [mental well-being, depression, anxiety, and perceived stress]?	On the contrary to a single alternative hypothesis in the frequentist approach, Bayesian approach gives a probability distribution for multiple alternative hypotheses.	We plan to perform a Sequential Bayes Factor Design Analysis (SBFDA). We will start with an initial design priors for the variables, draw an initial	We will perform a Bayesian multivariate multiple regression analysis. We will use a default prior (Normal distribution) from R-studio package 'rstanarm' which is weakly informative i.e. the prior distribution is	Obtaining a BF_{10} ≥ 30 would imply that the screen use time combined with other sets of predators in that model, is strongly correlated with mental well-being, depression,

	Therefore, we aim to test the influence of all the independent variables on the dependent variables.	sample size of $N_{eff.}$ and calculate the Bayes factor for the alternative models relative to the null model.	scaled based on the actual range of the outcome variables, and this will reduce the uncertainties in the posterior probabilities. Therefore, we plan to start with these default priors and then make some adjustments to the distributions as per our dataset requirements.	anxiety, and perceived stress.

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Abbreviations

BMI: Body Mass Index
PHQ-9: Patient Health Questionnaire
PSS-10: Perceived Stress Scale
SU: Substance use
SL: Average sleep time
SBFDA: Sequential Bayes Factor Design Analysis

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Supplementary information

Example questionnaire

Screen exposure time and its association with mental health issues in young adults in India

PART 1:

- Introduction to the study:
  This study aims to measure the screen exposure times and patterns in young adults in India, study the hypothesis that increased screen exposure time is associated with poorer mental well-being and establish differential thresholds for screen exposure time. It is a cross-sectional study of a pan-India convenience sample of young adults (18-24 years) that have access to digital devices with a screen and a minimum of secondary school education (10th pass). Socio-demographic details will be collected through a questionnaire designed by the authors; screen exposure time and patterns will be assessed using an adaptation of the screen time questionnaire to include data on different applications and websites used on electronic devices; while mental health parameters will be gauged using the Warwick-Edinburgh mental well being scale, GAD-7 (a screening test for anxiety disorders), PSS-10 (measuring perceived stress levels) and PHQ-9 (to screen for depression). The details collected via this form will only be used for the purpose of this study. The identity of participants won't be revealed.
  This study is being done by the Association for Socially Applicable Research (ASAR) in collaboration with the National Institute of Ayurveda (NIA). Ethics approval has been obtained from NIA.
  Participation in this study is completely voluntary. For any queries please reach out to asarforindia@gmail.com.

  Part 2

  After reading the above details, do you consent to participate in the study?
  Yes
  No

  Part 3

  Demographic details
  1. Age:
     - 18
     - 19
     - 20
     - 21
     - 22
     - 23
     - 24
     - Other: these would be discarded from data used for analysis

2. Sex
- Male
- Female
- Other: These would be discarded from data used for analysis

3. Place of residence:
- Rural
- Urban

4. State/Union Territories:
List Selection from all the states of India:
1. Andhra Pradesh
2. Arunachal Pradesh
3. Assam
4. Bihar
5. Chhattisgarh
6. Goa
7. Gujarat
8. Haryana
9. Himachal Pradesh
10. Jharkhand
11. Karnataka
12. Kerala
13. Madhya Pradesh
14. Maharashtra
15. Manipur
16. Meghalaya
17. Mizoram
18. Nagaland
19. Odisha
20. Punjab
21. Rajasthan
22. Sikkim
23. Tamil Nadu
24. Telangana
25. Tripura
26. Uttarakhand
27. Uttar Pradesh
28. West Bengal
29. Andaman and Nicobar Islands
30. Chandigarh
31. Dadra and Nagar Haveli and Daman & Diu
32. Delhi
33. Jammu & Kashmir
34. Ladakh
35. Lakshadweep
36. Puducherry

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5. City of Residence: _____

6. Educational Qualifications:
- 10th Pass
- 12th Pass
- Graduate
- Post Graduate
- Diploma

7. Employment Status:
- Student
- Self-employed
- Employed in Government Sector
- Employed in Private Sector
- Homemaker
- Unemployed

8. What do you feel is the level of your/your family's financial stress today? (29)
(response options range from 1 [overwhelming stress] to 10 [no stress at all]

9. On average over the past 3 months, how many hours do you sleep at night? (30)
- Less Than 6
- 6-7
- 7-9
- 9-10
- Greater than 10

10. Do you have any past/present history of being on Psychiatric Medications/Treatment?
- Yes
- No
- Other _____

11. Number of people living in your house:
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- Greater Than 10

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12. No of total rooms in your house (e.g if 2 bedrooms, 1 hall and 1 kitchen write 4 rooms):
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- Greater Than 10

13. Substance use question: In the last year have you ever drank (alcohol) or used drugs more than you meant to (alcohol, tobacco, marijuana, opioids, etc.)?
- Yes
- No

14. Have you felt you wanted or needed to cut down on your drug and drinking in the last year? (31)
- Yes
- No

15. Enter your height in metres (m)
Enter your body weight in kilograms (kg)

PART 4:

Screen-time Questionnaire

For the following set of questions, ***primary activity*** is defined as the main activity you are engaged in rather than using a television/other screen in the background while performing another activity such as cooking or exercising.

Screen use on an average weekday Thinking of an average weekday (from when you wake up until you go to sleep), how much time do you spend using each of the following types of screen as the primary activity? You must answer both hours and minutes. **If zero please type "0" in the box.**		
	Hours	Minutes
Television		
TV-connected devices (e.g. streaming devices, video game consoles)		
Laptop/computer		
Smartphone		

Tablet		

Out of the number of hours that you have entered for use on laptop/ smartphone/tablet; how much time do you spend for the activities mentioned below? Please enter the value in minutes and hours.

In case you're uncertain about what time to enter follow the following instructions: 1. In your phone settings, go to Apps & Notifications ----> Screen Time. Then enter the values which are given for each of the apps mentioned below.

		Hours	Minutes
Online learning/ online classes			
Work (Online meetings, presentations, etc)			
Gaming (Gaming consoles, Online games, etc)			
Entertainment	Netflix, Amazon Prime, Hotstar, etc.		
	Youtube		
	Sports streaming channels		
Social Media	Facebook		
	Instagram		
	Snapchat		
	Twitter		
	Other social media		
Messaging/ connecting	Whatsapp		

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with people	Facebook Messenger		
	Telegram		
	Other messaging apps (Signal, text messages)		
Social forums (eg, Reddit, Quora)	Reddit		
	Quora		
	Other social forums		
Shopping websites (eg. Amazon, Myntra, Flipkart)			
News/ current events (eg. BBC news, TOI, Flipbpard)			
Fitness tracking apps (i.e. Any app that helps you track your calorie intake, fitness level, etc.) (eg. Healthify me, etc.)			
Pornography			
Other applications: Camera, photo/video editing apps			

Screen use on an average weekend day

Now, thinking of an average weekend day (Saturday or Sunday), how many hours over the course of the whole day (from when you wake up until you go to sleep) do you spend using each of the following types of screen as the primary activity? You must answer both hours and minutes. **If zero please type "0" in the box**.

	Hours	Minutes
Television		
TV-connected devices (e.g. streaming devices, video game consoles)		
Laptop/computer		
Smartphone		
Tablet		

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Out of the number of hours that you have entered for use on laptop/ smartphone/tablet for weekend use; how much time do you spend for the activities mentioned below? Please enter the value in minutes and hours.

In case you're uncertain about what time to enter follow the following instructions: 1. In your phone settings, go to Apps & Notifications ----> Screen Time. Then enter the values which are given for each of the apps mentioned below.

		Hours	Minutes
Online learning/ online classes			
Work (Online meetings, presentations, etc)			
Gaming (Gaming consoles, Online games, etc)			
Entertainment	Netflix, Amazon Prime, Hotstar, etc.		
	Youtube		
	Sports streaming channels		
Social Media	Facebook		
	Instagram		
	Snapchat		
	Twitter		
	Other social media		
Messaging/ connecting with people	Whatsapp		
	Facebook Messenger		

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	Telegram		
	Other messaging apps (Signal, text messages)		
Social forums (eg, Reddit, Quora)	Reddit		
	Quora		
	Other social forums		
Shopping websites (eg. Amazon, Myntra, Flipkart)			
News/ current events (eg. BBC news, TOI, Flipbpard)			
Fitness tracking apps (i.e. Any app that helps you track your calorie intake, fitness level, etc.) (eg. Healthify me, etc.)			
Pornography			
Other applications: Camera, photo/video editing apps			

For the following set of questions, **background screen** is defined as the use of a television or another screen near you while performing other activities such as exercising, cooking, and interacting with family/friends.

Thinking about a regular weekday (Monday through Friday), on average, how many hours **over the course of the whole day** (from when you wake up until you go to sleep) are you exposed to background screen use?

Example: If you exercise in the morning for one hour while watching the TV news, you use your smartphone for one hour while eating lunch and an additional 30 minutes while eating dinner, you would estimate that you are exposed to 2 hours and 30 minutes of background screen use per day.

	Hours	Minutes
Background screen use on a regular weekday		

Now we want to ask about background screen use **during the evening specifically**. On average, how many hours per evening (Monday through Friday) are you exposed to background screen use from when you return from work until you go to sleep?
Example: If you regularly prepare dinner with the television on for one hour, and you keep the television on for an additional hour while using your smartphone for social media use, you can estimate that you are exposed to 2 hours of background screen use every evening.

	Hours	Minutes
Background screen use on a regular weeknight		

Now we want to ask about background screen use **during the weekend**. Thinking about a regular weekend day (Saturday or Sunday), on average, how many hours over the course of the whole day (from when you wake up until you go to sleep) are you exposed to background screen use?

Example: If you have the television on while you do some online shopping for two hours, and you keep the television on when friends come over to visit for an additional two hours, you can estimate that you are exposed to 4 hours of background screen use every evening.

	Hours	Minutes
Background screen use on a regular weekend day		

In order to get an accurate measurement of screen time, we are asking you to enter the total screen time as seen in your phone settings.
If you are an iOS user, in your phone, go to settings —-----> screen time. Please enter the total daily average screen time.
If you are an Android user , in your phone, go to settings —-----> Digital Wellbeing & parental controls. Tap on the graph and enter the total screen time that you see for yesterday.

PART 5:

Warwick-Edinburgh Mental Well-being Scale:
Below are the statements regarding your feelings and thoughts. Please select the one that describes your experience of each one over the past 2 weeks.

Statement	**None of the time**	**Rarely**	**Some of the time**	**Often**	**All the time**
I've been feeling optimistic about the future	1	2	3	4	5
I've been feeling useful	1	2	3	4	5

I’ve been feeling relaxed	1	2	3	4	5
I’ve been feeling interested in other people	1	2	3	4	5
I’ve had energy to spare	1	2	3	4	5
I’ve been dealing with problems well	1	2	3	4	5
I’ve been thinking clearly	1	2	3	4	5
I’ve been feeling good about myself	1	2	3	4	5
I’ve been feeling close to other people	1	2	3	4	5
I’ve been feeling confident	1	2	3	4	5
I’ve been able to make up my own mind about things	1	2	3	4	55
I’ve been feeling loved	1	2	3	4	5
I’ve been interested in new things	1	2	3	4	5
I’ve been feeling cheerful	1	2	3	4	5

PART 6: Generalized Anxiety Disorder- 7 (GAD-7) scale

Over the last 2 weeks, how often have you been bothered by the following problems?

	Not at all	Several days	Over half the days	Nearly everyday
1.Feeling nervous, anxious, or on edge	0	1	2	3
2.Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it’s hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3

7. Feeling afraid as if something awful might happen	0	1	2	3

Part 7: Perceived stress scale-l0

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate by circling how often you felt or thought a certain way.

	Never	Almost Never	Sometimes	Fairly often	Very often
1. In the last month, how often have you been upset because of something that happened unexpectedly?	0	1	2	3	4
2. In the last month, how often have you felt that you were unable to control the important things in your life?	0	1	2	3	4
3. In the last month, how often have you felt nervous and “stressed”?	0	1	2	3	4
4. In the last month, how often have you felt confident about your ability to handle your personal problems?	0	1	2	3	4
5. In the last month, how often have you felt that things were going your way?	0	1	2	3	4
6. In the last month, how often have you found that you could not cope with all the things that you had to do?	0	1	2	3	4
7. In the last month, how often have you been able to control irritations in your life?	0	1	2	3	4
8. In the last month, how often have you felt that you were on top of things?	0	1	2	3	4
9. In the last month, how often have you been angered because of things that were outside of your control?	0	1	2	3	4
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

PART 8: Patient health questionnaire-9 (PHQ-9)

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Over the last 2 weeks, how often have you been bothered by any of the following problems?

Questions				
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0		2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

If any of the above problems were identified, how difficult have these made it for you to do your work, take care of things at home, or get along with other people?
Not Difficult At All
Somewhat Difficult
Very Difficult
Extremely Difficult

Should you score ≥ 5 on this questionnaire, we would recommend seeking help from a professional. Here are a few resources that might help you:

1. Kiran (1800–599–0019**)** is a national 24/7 toll-free helpline launched by the Ministry of Social Justice and Empowerment to help people with suicidal thoughts, depression, and other mental health issues.
2. AASRA (http://www.aasra.info/) (+91–22–27546669) is a 24-hours-a-day, 7 days a week nationwide voluntary, professional and confidential services.
3. National Emergency Number: 112

Part 9:

Thanks for filling the form.
We truly appreciate the time you took to fill the form out. We again would like to clarify that the information provided by you will be used solely for the study as mentioned in the beginning. Thank you very much once again! :)

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If you are sure of the information you have filled in, click on the Submit button.

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Supplementary Files

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