

The Combined Effect of Exercise, Meditation and Motivational Interviewing on Smartphone Addiction in College Students

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Abstract:

➤ Background:

Smartphone addiction has become a serious concern among adolescents leading to depression and anxiety. Excessive smartphone use is clearly associated with musculoskeletal and psychological impacts such as muscle discomfort, stiffness, shoulder, back, and neck diseases. The goal of this study is to critically analyze if smartphone addiction exists and to establish a protocol (consisting of a cognitive behavioral approach, motivational Interviewing, mindfulness, and exercise rehabilitation) for reducing smartphone addiction among collegiate students.

➤ Methods:

Forty-seven subjects who have SAS score more than 29 of either gender ranging from 18 to 25 years college going students were selected in this study and received meditation, motivational interviewing, aerobic exercise, flexibility exercise & Jacobson's relaxation training. Treatment plan for 45 min per day for a period of 2 week was given by the researcher under the supervision. At the end of 2 week, post readings of SAS score were evaluated again.

➤ Result:

The (Mean± SD) for the SAS- score at the pre-treatment and post treatment were 36.43±5.042 and 24.55±5.698 respectively. The score has been found to be very significant. with (p value< 0.05).

➤ Conclusion:

The result concluded that the acute period of 2 week protocol which included meditation, motivational interviewing, aerobic exercise, flexibility exercise & Jacobson's relaxation training showed significant improvement in reducing smartphone addiction among collegiate students.

Keywords: Smartphone Addiction, Students, Aerobic, Meditation, Flexibility, Relaxation.

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I. INTRODUCTION

Addiction, according to Goodman (1990), is a state in which a problematic behavior is characterized by repeated

inability to manage the behavior and perseverance in the behavior despite substantial negative consequences (Panova & Carbonell, 2018). Griffiths outlined some of the most typical indications of addiction, such as mood changes,

tolerance, salience, withdrawal symptoms, conflict, and relapse (Panova & Carbonell, 2018). However, the intensity of these requirements might vary greatly, making them more or less relevant. To summarize the theoretical concept of addiction, the (severe) pain, impairment, or negative consequences, psychological (craving, salience, and loss of control), and physical dependence (tolerance and withdrawal) that urge one to continue the behavior might be employed (Panova & Carbonell, 2018). Since the invention of the cell phone, the unusual use of this gadget has raised the question of whether its abuse could lead to addiction (D. Kim et al., 2014).

Smartphones provide socialization, entertainment, information discovery, time management, coping strategies, and social identity preservation (Panova & Carbonell, 2018). However, recent research has found that excessive smartphone use is connected with sleep, daytime activity, and performance problems in students, all of which are biorhythm domains (Kumar et al., 2019). According to recent studies, young people are the most affected by smartphone addiction. Smartphone addiction has been demonstrated to have a negative influence on the student population in particular (Mangot et al., 2018). Because students are youthful, open to new experiences, and reliant on technology, they tend to use and experiment with smartphones more. As a result, they are more prone to succumbing to smartphone addiction. Given the recent COVID19 pandemic, students' changing lifestyles, Students are now even more susceptible to smartphone addiction due to factors including online classrooms, homebound circumstances that necessitate use of social media, and loneliness that leads to excessive smartphone use for entertainment and time pass. (Dhamija et al., 2021).

In India, the prevalence of smartphone addiction ranged from 39% to 44% (Davey & Davey, 2014). According to one survey, 52% of medical students are addicted to their smartphones (Dhamija et al., 2021). Men (46.15%) were shown to be more addicted to smartphones than women (33.33%). 63.39% of research participants had difficulties sleeping based on their PQSI scores, and 62.05% reported poor health based on their GHQ levels. The duration of daily smartphone use, SAS-SV scores, and GHQ scores were all found to have a positive relationship with overall PQSI values (Chatterjee & Kar, 2021).

According to research findings, smartphone addiction is highly linked to depression and anxiety (Ratan, Parrish, et al., 2021). Smartphone overuse includes a desire to obsessively checking messages, and such behavior patterns may lead to "reassurance seeking," which includes symptoms such as worry and despair (Ratan, Zaman, et al., 2021). Excessive smartphone use is clearly associated with musculoskeletal and psychological impacts such as muscle discomfort, stiffness, shoulder, back, and neck diseases. Long-term cell phone use can cause unfavorable postures, such as a forward-leaning head posture, which can injure the cervical spine and cause neck pain (Soliman Elserty et al., 2020). The effects of Computer Vision Syndrome on the eyes included fatigue, dryness, blurry vision, irritation, or ocular redness, as well as pain and weakness in the thumbs and wrists and auditory and

tactile illusions, such as the impression of hearing a ring or feeling a cell phone vibration. This increased the incidence of de Quervain's tenosynovitis. (Chen et al., 2017).

As smartphone addiction becomes a serious concern among adolescents, building a scale to measure the levels and circumstances of smartphone addiction among adolescents appears necessary in order to safeguard them from the addiction's negative impacts (D. Kim et al., 2014). One of the scales used to test addiction is the SAS-SV scale, which is used to assess smartphone addiction among college students. In studies, the SAS-SV demonstrated good validity and reliability for assessing smartphone addiction. The brief version of the smartphone addiction scale developed and validated in this study could be used to assess smartphone addiction in both research and community settings (Billieux et al., 2015). The brief version of the smartphone addiction scale developed and validated in this study could be used to assess smartphone addiction in both research and community settings (Kwon et al., 2013). A study found that behavioral treatments (cognitive behavioral approach, motivational interviewing, mindfulness behavioral treatment) and exercise rehabilitation reduced smartphone addiction (H. Kim, 2013). During the escitalopram open trial phase, which was followed by a 9-week double-blind discontinuation phase comparing escitalopram to placebo, a study looking into the role of pharmacotherapy in the treatment of addiction found a decrease in non-essential Internet use and compulsions for Internet use (Wolniewicz et al., 2020). However, in the double-blind phase, escitalopram was not substantially superior than placebo (Zajac et al., 2017). Addiction rehabilitation results in long-term abstinence, better physical and psychological health, higher quality of life and satisfaction, purposeful living, and citizenship (Inanlou et al., n.d.).

The goal of this study is to critically analyze if smartphone addiction exists and to establish a protocol (consisting of a cognitive behavioral approach, motivational interviewing, mindfulness, and exercise rehabilitation) for reducing smartphone addiction among collegiate students.

➤ *Need of Study:*

- To understand the effect of exercise on smartphone addiction in college students.
- To understand the effect of meditation on smartphone addiction in college students.
- To understand the effect of motivational interviewing on smartphone addiction in college students.

II. MATERIAL AND METHODS

This is an experimental study conducted at the SGT Medical College Hospital & Research Institute, Gurugram Haryana, India. Forty-seven subjects who have SAS score more than 29 of either gender ranging from 18 to 25 years college going students were included in the study. Those who were having any diagnosed sleep disorder, thumb pathology, psychological disorder, and history of using caffeine 2hrs prior to session and alcohol 24hrs prior to session were

excluded. Using the G-power software, the sample size was determined with a 10% power and a 95% confidence interval. On the basis of inclusion and exclusion criteria, the samples of 78 participants were chosen from the general community. Out of 52 participants, 26 were eliminated (because they did not match the requirements for inclusion), and 5 did not receive follow-up. Under the researcher's supervision, 47 subjects who completed the programme were given the Jacobson's relaxation training routine of 45 minutes per day for a period of two weeks, along with aerobic exercise, flexibility exercises, motivational interviewing, and meditation. Post readings of the SAS score were taken at the end of the two weeks.

➤ *Outcome Measure:*

• *Smartphone Addiction Scale:*

The smartphone addiction scale (SAS), which is based on self-reporting, consists of six components and 33 items on a six-point Likert scale (1: "strongly disagree" and 6: "strongly agree"). The six factors were everyday life disruption, optimistic expectation, retreat, a relationship focused on cyberspace, overuse, and tolerance. The internal-consistency test result (Cronbach's alpha) throughout its development stages was 0.967.

➤ *Study Variables:*

• *Independent Variables*

- ✓ Meditation
- ✓ Jacobsons Relaxation Exercise
- ✓ Aerobic exercise
- ✓ Motivational Interviewing
- ✓ Flexibility exercise

• *Dependent Variables*

- ✓ Smartphone addiction scale

➤ *Intervention:*

• *Meditation:*

Mindfulness Breathing: It included four sessions:

✓ *Body Mindfulness:*

It has four steps: Identifying the in-and-out breath, following the entire length of the breath, bringing the mind back to the body and relaxing the body.

✓ *Mindfulness of Feeling:*

It involves being peaceful, enjoying the pleasure of being in the present, studying how sensations affect the mind, and relaxing feelings.

✓ *Mindfulness of Mind:*

It entailed focusing the mind, monitoring the mind, making the mind joyful, and releasing the mind from unfavorable mental states.

✓ *Mindfulness of Thoughts:*

It necessitated paying attention to how thoughts change over time, becoming aware of how they disappear monitoring the pauses between thoughts, and letting thoughts develop spontaneously without feeding them.

- Total Duration: 5 minutes
- Frequency: Daily for 2 week

• *Body Scan Meditation*

✓ *Subject Position:* Sitting on a chair.

✓ *Procedure:* Subjects were instructed to pay attention to how it feels to be anchored to the earth. After that, the therapist started directing Body Scan Meditation. During this technique, the person concentrated on the feelings and sensations of particular body parts, gradually shifting attention from one part to the next until, at the conclusion of the session, paying attention to the body as a whole. The therapist invited the subject to mentally breathe in that body part while the emphasis on that specific body part. Additionally, the subject was instructed to return focus to their body whenever they became aware that anything else was taking up the mind (such as ideas, Emotions, recollections, etc.)

- Total Duration: 10 minutes
- Frequency: Daily for 2 week

• *Jacobsons Relaxation Exercise:*

✓ *Subject Position:* Progressive muscle relaxation takes place in quiet environment in supine lying position.

✓ *Procedure:* The following muscle groups are taken into account in this exercise: the hand and forearm, upper arm, forehead, eyes, cheeks, mouth, and jaw, as well as the neck, shoulders, shoulder blades, chest, stomach, hips, and buttocks. These muscles should be tensed and then released in the prescribed sequence.

- Total Duration: 5 minutes
- Frequency: Daily for 2 week

• *Aerobic Exercise:*

Subjects were instructed to walk 8000- 10,000 aerobic steps daily which is monitored by pedometer.

- ✓ Frequency: Daily for 2 week

• *Motivational Interviewing (Mi):*

MI is done in two phases: building motivation to change and strengthening the commitment to change.

Building Motivation to Change: It Includes:

- ✓ Asking Open- ended question about the smartphone addiction.
- ✓ Make affirmations: It is done by appreciating or complimenting them for their courage to discuss about smartphone addiction, also encourage them about the efforts they are taking to change.
- ✓ Use Reflections: Make them understand their motivation more i.e., by telling them how their health has been affected due to overuse of smartphone

Strengthening the Commitment to Change: By Asking Questions Related to Four Categories:

- ✓ Disadvantage of the status: what difficulties they have faced from smartphone overuse?
- ✓ Advantage of change: How would they like to be the health in five years; what the advantages of reducing use of smartphone
- ✓ Optimism of change: Asking them about the strength that would help to make a change.
- ✓ Intention to change: Asking them in what ways they want their life to be different in 5 years; and if they could do anything what change it will be.

- Total duration: 10 minutes
- Frequency: Daily for 2 week

- *Flexibility Exercise:*

- ✓ *Subject Position:* Sitting posture on a chair.
- ✓ *Procedure:* Subjects were instructed keeping the knee extended try to touch the tips of feet, from a seated position in a chair with feet flat on the floor, complete a trunk rotation to one side and elevation of the same-side upper limb above the head, stretching as high as you can.

- Duration: 15 min
- Frequency: Daily for 2 week.

- *Study Design:*

Experimental study (PRE- POST DESIGN)

- *Study Setting:*

Study was conducted in SGT Medical College Hospital & Research Institute, Gurugram Haryana, India.

- *Inclusion Criteria:*

- ✓ SAS Score 29 And Above
- ✓ The subject must be of the age group of 18 to 25 years.

- *Exclusion Criteria:*

- ✓ The subject diagnosed with sleeping disorder.
- ✓ The subject diagnosed with psychological disorder like Anxiety, depression, PTSD, etc.
- ✓ Subject diagnosed with thumb pathology.

- ✓ Subject with a history of caffeine 2 hours before the session.

- *Data Collection Tool:*

- ✓ Pedometer
- ✓ SAS Scale

- *Data Collection Procedure:*

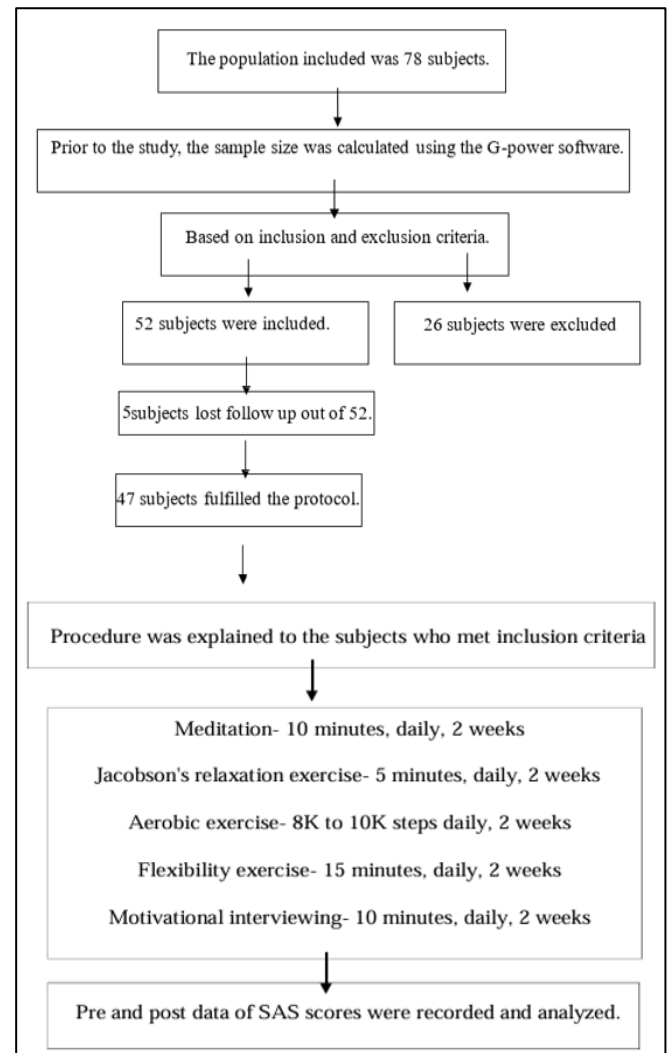


Fig 1 Data Collection Procedure

➤ *Statistical Analysis:*

SPSS 20.00 for Windows 7 was the software programme used to conduct the statistical analysis. All the variables' means and standard deviations were computed. The mean of the data from before and after the intervention were compared using a one sample t-test. The p- value<0.05 was considered to be statistically significant.

III. RESULT

In the present study total of 47 subjects of 18 to 25 years were selected who met the inclusion criteria and completed the treatment protocol of 40 min per day for a period of 1 week.

Table 1 Shows the Baseline Data of Participants. Mean and Standard Deviation of Participant's Age, Height, Weight and BMI. It also Shows the Standard Errors of the Variables.

Characteristics (n= 47)	(Mean± SD)	Std. Error
Age	21.70 ± 1.852	0.270
Height	168.04 ± 7.576	1.105
Weight	62.15± 8.775	1.280
BMI	22.04 ± 2.866	0.418

Table 2 Shows the Distribution of Level of SAS Scores of the Study. Mean & SD at the Pretreatment and Post Treatment was 36.43 ± 5.042 and 24.55 ± 5.698 Respectively. The Score was Found to be Highly Significant with p-Value< 0.05.

	No. of students(N)	Mean	Std. Deviation	P-value
Pre-treatment	47	36.43	5.042	0.000*
Post-treatment	47	24.55	5.698	

*p-Value≤ 0.0

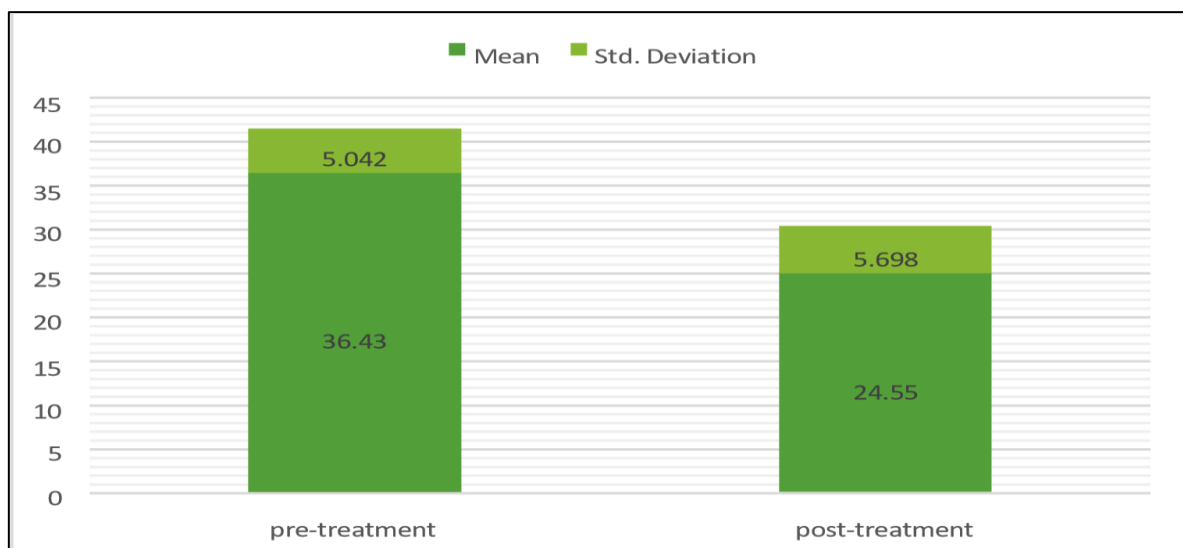


Fig 2 Shows the Mean and Standard Deviation of SAS- Score

Table 3 Shows the Association of Post-Treatment SAS Scores with Gender Variance of the Study. Mean & SD for Male and Female Post Treatment were 24.50 ± 5.203 and 24.58 ± 6.021 Respectively. The Score was Found to be Statistically Non-Significant with (P-value> 0.05).

	No. of Students(N)	Mean	Std. Deviation	P-value
Female	31	24.58	6.021	0.964
Male	16	24.50	5.203	

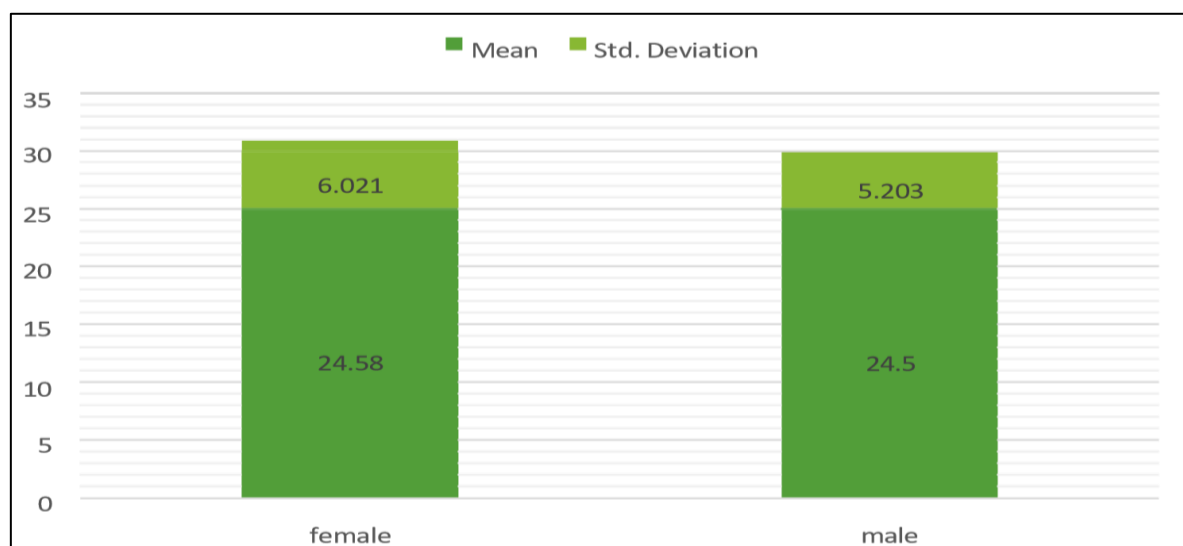


Fig 3 Shows the Post Treatment Gender Variance SAS- Score

IV. DISCUSSION

The acute intervention of 2 weeks of conservative management which included Meditation, Motivational Interviewing, Aerobic Exercise, Flexibility Exercise & Jacobson's relaxation training protocol of 45 min per day for a period of 2 week proved to show significant improvement in SAS- score among collegiate students aged between 18 to 25 years. A study done by (Haosen ni et. Al.) in 2024 showed similar result that meditation and relaxation exercise was found to be effective in reducing addiction among adults. The result of the study supported the hypothesis that the designed protocol would lead to reduction in smartphone addiction level. The population was university students considering the current prevalence of smartphone addiction among university students (Sunday, O. J., Adesope, O. O., & Maarhuis, P. L., 2021). Literature shows studies evaluated the effect of physical activity/ exercise for smartphone addiction. Similarly, studies related to psychological intervention for smartphone addiction. But there are limited or no studies evaluated the combined effect of exercise (flexibility, aerobic, relaxation) and psychological intervention (meditation, motivational interviewing) for smartphone addiction among university students.

Psychological intervention improves the emotional adjustment and expression ability of addiction and change the emotional state of students (Wenhai and Jiamei, 2009). Exercise rehabilitation could seek mental changes through feeling of confidence, satisfaction, and new feeling of happiness.

Studies concluded that mindfulness- based training, meditation, 30 minutes of moderate intensity acute aerobic exercise showed significant improvement in smartphone addiction (Garland, E. L., & Howard, M. O; Fan, H., Qi, S., Huang, G., & Xu, Z., 2021; Kim, H., 2013). However, no study has evaluated the combined effect of psychological and exercise based treatment effect on smartphone addiction. We examined by references about various complementary treatment approaches present in the literature for rehabilitation of smartphone addiction and we have evaluated the acute effect of all the treatment approaches on smartphone level addiction among university going students which showed positive effect on level of smartphone addiction.

V. FUTURE RECOMMENDATION

- Long term duration effect can be evaluated in future studies.
- Objective evaluation of smartphone addiction can be used in future studies.
- Post- treatment long term follow-up can be evaluated in future studies.

VI. CONCLUSION

This study suggests that college students among the ages of 18 and 25 who comply with a 2-week conservative control

routine that includes meditation, motivational interviewing, aerobic workouts, flexibility sporting activities, and Jacobson's relaxation education had some distance lower ranges of smartphone dependency. The effects are consistent with different studies that highlight the effectiveness of exercise, relaxation strategies, and meditation in lowering addictive behaviors. This take a look at fills a substantial vacuum inside the literature and offers a comprehensive method for treating phone addiction via combining mental and bodily treatment plans.

The protocol not only aids in lowering dependency stages but also complements emotional adjustment, promotes mental well-being, and fosters a feel of self belief and satisfaction amongst college students. while previous studies have explored the independent effects of psychological and exercise-based totally interventions, the combined method evaluated here offers a promising framework for complete dependency management.

Future studies ought to inspect the long-term consequences of this protocol, include objective measures of phone dependency, and assess the sustainability of outcomes through prolonged observe-ups. those efforts will similarly validate the efficacy of this technique and support its integration into broader rehabilitation strategies for cellphone addiction.

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➤ *Conflict of Interest:*

- The Authors have no conflict of interest.

➤ *Credit Authorship Contribution Statement*

- Ashutosh Kumar, Garima Mehta, Shivanjali Singh: Conceptualization, Data curation, Investigation, Methodology, Roles/Writing - original draft, Writing - review & editing.
- Anushree Rai: Project administration, Supervision, Visualization, Writing - review & editing, Conceptualization, Formal analysis, Investigation, Methodology, Resources, Software, Supervision, Validation, Visualization, Writing - review & editing.
- All authors read and approved the final manuscript.

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