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Research Paper

The Impact of Problematic Smartphone Use on Procrastination: Evidence from Emerging Adults

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ABSTRACT

Procrastination is an increasingly prevalent phenomenon, especially among emerging adults. The present study aimed to find the relationship between problematic smartphone use, sleep quality, and procrastination among emerging adults and explore the predictors of procrastination among emerging adults. The samples consisted of 122 emerging adults (18-25) of whom 62 were women and 60 were men, from Kerala. The data obtained from the participants were consolidated and subjected to analyses using non-parametric tests. The participants were administered Chol Shin's Sleep Quality Scale (2012), Kwon et al Smartphone Addiction Scale (SAS) -SV (2013), and Clarry Lay's Procrastination Scale (1986). The study's findings show a significant relationship between problematic smartphone use and procrastination among emerging adults. The result also indicates there is no significant relationship between sleep quality and procrastination among emerging adults. Findings suggest that problematic smartphone use is a significant predictor of procrastination among emerging adults.

Keywords: *Problematic Smartphone Use, Sleep Quality, Procrastination, Emerging Adults*

Emerging adulthood is a period in life that is followed by early adulthood. Usually, emerging adults are characterised as young adults in the age range of 18 to 25 age group. This period of life can also be said as the phase of life when a person is faced with a change or growth physically, mentally, and biologically. During this stage, they tend to find their identity, create more self-focus, take more responsibilities, and be an optimistic person in life. In this phase, adults must be energetic, active, and enthusiastic; most of the emerging adults are in a slothful or indolent condition. Some of them are too lazy to do the activities or tasks given to them, and some others try to escape from or avoid the activities given to them. Due to all these reasons, people in this age group tend to procrastinate the tasks they want to do. "Procrastination is the art of keeping up with yesterday" — Don Marquis The origin of the term is derived from the Latin 'Pro' (Forward on in favour of) and 'Crastinus' (of tomorrow), and it refers to either avoiding a task altogether or deferring it to a later, often unspecified time. As one of the most common and ubiquitous forms of self-regulation failure (Ferrari et al., 2007; Steel, 2007), procrastination is increasingly recognized as having relevance for several consequential outcomes, including academic

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performance (Hen & Goroshit, 2014), work-life (Gupta et al., 2012), well-being (Stead et al., 2010), and physical health (Sirois, 2015; Sirois et al., 2003). This is especially true when procrastination is assessed as a relatively stable, trait-like chronic tendency to voluntarily and unnecessarily delay intended and important tasks to regulate immediate mood despite the negative consequences of this delay for the future self (Sirois & Pychyl, 2013). Although procrastination is a phenomenon that is globally seen but equally likely unfavourable around the globe, it affects individuals' daily routines in a negative way (Letham, 2004; Hoover, 2005; Morelli, 2008; Schitt, 2008). Milgram (1991) proposed that procrastination is initially defined as a series of delayed or postponed tasks perceived as more important or satisfying, resulting in the imperfect behavioural product, further leading to emotional upset. Procrastination dominates all areas of behaviour and action, but the most general form is academic procrastination, which occurs in the academic setting. Procrastination involves avoiding doing what we know we should be doing. It also leads to inefficient behavioural outcomes, and individuals may feel problems in dealing with the environment productively (Milgram et al., 1998).

In 1953, Freud tried to explain the tendency of procrastination based on the concept of avoiding tasks (Ferrari et al., 1995). According to this concept, tasks that are not completed will be avoided because they pose a threat to the ego. Freud offers a postulate that anxiety serves as a warning sign of the existence of a threat to the ego when individuals face dangerous things that cannot be realised. When the ego recognises the existence of a threat posed by a task, a defence mechanism such as avoiding the task will be raised. Classical learning theory explains that behaviours usually occur automatically through the provision of reinforcement or lack of punishment (Ainslie, 1975). Temporal Motivation Theory (TMT) has its roots in Ainslie and Haslam's work in 1992, which was named Pico economics or Hyperbolic Discounting (Ferrari et al., 1995). This theory tries to explain the selection processes of someone's decision-making or behaviours. TMT suggests that any person always prioritises activities which promise the highest utility, at least from the perspective of that person for that certain time. In other words, people tend to procrastinate when they think the utility of doing the task is low. According to the emotion-regulation theory (sometimes also called the temporal mood repair theory), procrastination occurs when people prioritise their short-term mood over long-term goal achievement and well-being. A significant component of the emotion-regulation theory is a temporal disjunction, where people feel disconnected from their future selves, which leads them to prioritise the desires and needs of their present selves.

Sometimes, procrastinators can be creative in their avoidance strategies; one prominent way is problematic smartphone use. Billieux (2012) defined the problematic use of mobile phones as "an inability to regulate one's use of the mobile phone, which eventually involves negative consequences in daily life. In an era characterised by unprecedented technological advancements, smartphones have become an integral part of daily life, revolutionising communication, information access, and entertainment. According to a survey conducted by the Mobile Ecosystem Forum from November to December 2019, the highest penetration rate among smartphone users was in the age group of 16 to 24 years, a common occurrence among students. Increased procrastination increases problematic phone use, such as compulsive Instagram scrolling and addiction. People who frequently use social media and digital media say they use the phone because they are delaying some other important work. In an intervention study for average Facebook users and social online gamers, reducing the frequency of use improved life satisfaction and decreased procrastination. Some people do passive procrastination – the act of delaying important pending work when you know you

shouldn't; often characterised by an inability to complete or begin intentionally delayed work. From a procrastination point of view, phones are a distraction from the negative emotions of procrastination; and from a self-control point of view, phones are an object of our desire – an object we are emotionally drawn to for pleasure, satisfaction, and relief from displeasure. Frequent aimless phone use can be a symptom of procrastination. Smartphone users are tempted to use smartphones because it is informative, accessible devices. Many studies reported that long-term use of smartphones is associated with complaints about phone ringing (ringxiety) problems, Nomophobia (No Mobile Phone Phobia) and fear of missing out (FoMo), which means that users feel disconnected from the world if their smartphones are out of reach.

It has been reported that problematic Internet use may affect sleep quality, due to reducing rapid eye movement (REM) sleep, slow wave sleep, and sleep efficiency, or suppressing the onset time of melatonin secretion and delaying the beginning of sleep due to the bright light of a computer screen at midnight. Using mobile and generally, internet-based technologies disturbs sleep quality by receiving messages may wake users at night. In this regard, it is reported that the adverse effect of electromagnetic fields released by smartphones on sleep quality can be measured through electroencephalograms. Information and communication electronic devices interfere with the chronotype or circadian clock by emitting bright light by delay this endogenous clock, and causing sleep disturbance. The number of sleep latencies was higher in smartphone users, but there was no relation between smartphone ownership and sleep disturbance. Checking the smartphone is informative and a sign of addiction that can be done repeatedly and is affected by sleep quality because this habit activates reward centres, sleep disturbance and stress, has disadvantageous for physical and psychological health and performance, such as obesity and lower study scores.

The Procrastination-Health Model proposed by Sirois and colleagues (Sirois et al., 2003) could be used to explain the associations between procrastination and poor sleep. The model posits that procrastination may affect health through both direct and indirect pathways. The direct pathway relates to the excessive stress that habitual procrastinators frequently experience from last-minute rushing to finish tasks or from missing deadlines (Sirois et al., 2015). The indirect pathway concerns behavioural routes: procrastinators might engage more in unhealthy behaviours that bring instant gratification and delay health-protective behaviours that incur costs and efforts now. Sleep is an important part of the human daily routine, according to the National Institute of Health. Improving your sleep quality can help ensure that your sleep cycles won't be interrupted, which in turn helps assure that you will wake up feeling energised. In the October 2013 issue of the journal Science, researchers published the results of a study indicating that the brain utilises sleep to flush out waste toxins. This waste removal system, they suggest, is one of the major reasons why we sleep.

Generally, understanding the interplay between sleep quality and procrastination highlights the importance of prioritising healthy sleep habits. By ensuring proper sleep, individuals can enhance their cognitive functioning, emotional well-being, and self-regulation, all of which contribute to better time management and reduced tendencies to procrastinate. The present study aims to explore the relationship between problematic smartphone use, sleep quality, and procrastination among emerging adults and to determine the predictors of procrastination among emerging adults.

METHODS

Sample

The sample used for the study includes emerging adults between the age group of 18-26 years, and the sample size considered was 122(N=122). The selected sample consists of 61(N=62) females and 60 (N=60) males.

Tools

Three standardised tools used for the study are the Smartphone addiction Short-version scale (SAS-SV), Sleep Quality Scale (SQS), and Lay Procrastination scale (1986). Informed consent was obtained through the online survey, and a socio-demographic data sheet was also included in the questionnaire, asking for their name, gender, age, educational level, marital status, and socio-economic status.

- **Smartphone Addiction Scale short version (SAS-SV)**: This instrument is used to examine smartphone addiction and was developed by Kwon et al (2013). This scale consisted of six factors (daily-life disturbance, positive anticipation, withdrawal, cyberspace-oriented relationship, overuse, and tolerance from the original version of the smartphone addiction scale) with ten items each, rated using the six-point Likert scale (1: strongly disagree, 2: disagree, 3: weakly disagree, 4: weakly agree, 5: agree, and 6: strongly agree) The scoring of SAS-SV was done by adding the scores altogether which yields a total score (numerical data). A cut-off value of 31 and 33 was advised for boys and girls, respectively; a higher score indicated a higher risk of addiction, and a lower score indicated a lower risk of addiction. The SAS-SV was considered valid and reliable with a Cronbach's alpha value of 0.911.
- **Sleep Quality Scale**: Chol Shin's Sleep Quality scale (2012) is a scale with 28 questions with 2 items reverse scored. This is a generally efficient measure suitable for evaluating sleep quality; it requires about 5 to 10 minutes for administration, and it is a self-report inventory. Scoring Using a four-point, Likert-type scale, respondents indicate how frequently they exhibit certain sleep behaviours (0 = "few," 1 = "sometimes," 2 = "often," and 3 = "almost always"). Scores on items belong to factors 2 and 5 (restoration after sleep and satisfaction with sleep) and are reversed before being tallied. Total scores can range from 0 to 84, with higher scores denoting more acute sleep problems. Reliability and Validity An initial psychometric evaluation conducted by Yi and colleagues found an internal consistency of .92, and a test-retest reliability of .81. The SQS is strongly correlated with results obtained on the Pittsburgh Sleep Quality Index.
- **Lay Procrastination Scale (1986)**: The general Procrastination Scale was invented by Clarry Lay. The scale consists of 20 items, which require about 10-15 minutes to complete the test. Which is rated on a 5-point Likert scale where 1 means extremely uncharacteristic and 5 states extremely characteristic. Items 3, 4, 6, 8, 11, 13, 14, 15, 18, and 20 are reversed keys. The Responses across items are summed to obtain a single score, and high scores reflect procrastinators' behaviour. The validity and reliability of the scale have been found to have a Cronbach alpha of 0,82 and retest reliability of 0,80.

Data Collection Procedure

The data required for the study were collected from 122 participants using an online questionnaire through Google Forms that had closed-ended questions. Three different questionnaires were used to collect data from the sample. The consent form was obtained through the questionnaire form in Google Sheets.

After introducing the research topic and the requirements for the data collection, the questionnaires, along with the socio-demographic data sheet, were given to emerging adults aged between 18 and 26. The instructions on how to fill out the questionnaire were given on each scale. The students took about 20-25 minutes to complete the form.

Data Analysis

Data was obtained from participants using the instruments stated above, and it was subjected to statistical analysis to test the reliability of the hypotheses stated. Non -parametric tests such as Spearman's Correlation were used in the study. The stepwise regression analysis was also done to understand the predictors of procrastination.

RESULTS

The correlational analysis shows that procrastination has a positive correlation with smartphone use, indicating that the more procrastination, use more smartphone use is problematic. The variable problematic smartphone use is positively correlated with sleep quality. This shows that when problematic smartphone use increases, disturbances in sleep quality also increase. On the other hand, variables procrastination and sleep quality show no significant relationship. The significance value was found to be (.139), which is above the significance level p>0.01 significance level.

Table 1: Correlation between smartphone use, sleep quality, and procrastination by Spearman's rank correlation

Variable	PSU	SQ	P
PSU	1		
SQ	.254**	1	
P	.270**	.139	1

***. Correlation is significant at the 0.01 level (2-tailed)*

Table 2 shows a hierarchical regression analysis to determine the predictors of procrastination among emerging adults. From the results, problematic smartphone use has been determined as a significant predictor of procrastination among emerging adults. In step 1, the R2 value of 0.11 revealed that smartphone use explained an 11% variance in procrastination with $F(1,120) = 14.17$, $p < .001$. The findings revealed that smartphone use positively predicted procrastination ($\beta=0.33$, $p< .001$). This imparts the pivotal role of problematic smartphone use in influencing procrastination among emerging adults.

Table 2: Hierarchical Regression Results for Procrastination

Variable	B	LL	UL	SEB		R^2	ΔR^2
Step 1						0.11	0.11***
Constant	48.34***	42.70	53.99	2.85			
Problematic smartphone use	0.32 ***	0.15	0.49	0.08	0.33***		

*Note CL= confidence interval LL=lower limit UL=upper limit, ***p< .001*

DISCUSSION

The current study explored the relationship between problematic smartphone use, sleep quality and procrastination among emerging adults. The results showed that procrastination has a positive correlation with problematic smartphone use among emerging adults. This indicates that as procrastination use increases, problematic smartphone use also increases.

Procrastination is often linked to avoiding tasks that are perceived as difficult, boring, or unpleasant. Smartphones offer a convenient escape from these tasks, allowing individuals to engage in more enjoyable and entertaining activities, especially in emerging adults, as they are piled up with responsibilities and goals. These findings have been in a favourable relationship with Yang, X., Wang, P., and Hu Ping's (2020) study on trait procrastination and mobile phone addiction among Chinese college students, with results indicating that trait procrastination was positively related to mobile addiction. When faced with challenging or stressful tasks, individuals may turn to their smartphones as a form of escapism. This provides temporary relief from stress, but it also leads to delaying tasks that need to be addressed this has been supported by Akinci, T. (2021) study on the determination of Predictive Relationships Between Problematic Smartphone use, Self-Regulation, Academic Procrastination, and Path analysis results showed that problematic smartphone use is a significant predictor for both academic procrastination and academic stress. Thus, the findings of the present study also hold on to the existing evidence regarding the positive relationship between problematic smartphone use and procrastination.

Table 1 shows that the variable problematic smartphone use and sleep quality are positively correlated at a 0.01 level of significance. The variable problematic smartphone use is positively correlated with sleep quality at ($r=.25$, $p<0.01$). This indicates that when problematic smartphone use increases, disturbances in sleep quality also increase. Social media updates, news, and email material are just a few examples of the interesting stuff that can be found on smartphones. The cognitive stimulation that can result from engaging with such material just before bed can make it difficult to wind down and fall asleep. The inability to fall asleep at the desired time may be the result of exposure to bright screens and stimulating content. This has been supported by Christensen, M. A., et al (2016) study of direct measurements of smartphone screen time: relationships with demographics and sleep. This study aimed to characterise smartphone use by measuring screen time directly, determining factors that are associated with increased screen time, and testing the hypothesis that increased screen time is associated with poor sleep. Longer average screen times during bedtime and the sleeping period were associated with poor sleep quality, decreased sleep efficiency, and longer sleep onset latency. Smartphone addiction can cause a compulsive desire to constantly check messages, notifications, or social media updates, even at odd hours. This psychological relationship may cause sleep problems and poorer sleep quality. Kumar, V. A., Chandrasekaran, V., and Brahadeeswari, H (2019) investigated the 'Prevalence of smartphone addiction and its effects on sleep quality: A cross-sectional study among medical students and also found that smartphone addiction was found to be statistically significantly associated with poor sleep quality. Thus, the findings of the present study also hold on to the existing evidence regarding the positive relationship between problematic smartphone use and sleep quality.

From Table 1 the variables procrastination and sleep quality show no significant relationship. The significance value was found to be (.139) which is above the significance level $p>0.01$ significance level. This means the correlation is not significant at.01 level. There are many studies existing between these two variables and the result of those varies accordingly. In a previous study by Gort, C., et al (2021) on procrastination, affective state, rumination, and sleep quality: Investigating reciprocal effects with ambulatory assessment. The results do not support existing theoretical assumptions and research on antecedents and consequences of procrastination. Thus, findings of the present study is in favourable relationship to the existing evidence showing no significant relationship between sleep quality and procrastination.

Table 2 shows the impact of smartphone use on procrastination in emerging adults. In step 1, the R2 value of 0.11 revealed that smartphone use explained an 11% variance in procrastination with $F(1,120) = 14.17$, $p < .001$. The findings revealed that smartphone use positively predicted procrastination ($\beta=0.33$, $p< .001$). A study by Malla, H. A. (2021) on academic procrastination among secondary school students: exploring the role of smartphone addiction. The results revealed that a significant mean difference was observed between male and female secondary school students on academic procrastination and smartphone addiction, and a study by Rozgonjuk, D., et al. (2018) aimed to identify the level and proportions of smartphone addiction and academic procrastination among university students. The results also revealed a statistically significant positive relationship between academic procrastination and smartphone addiction and a statistically significant negative relationship between smartphone addiction and quality of life. Thus, supporting the existing evidence of problematic smartphone use as a predictor of procrastination among emerging adults. Indicating the influence of smartphone use among emerging adults.

The limitation of the study is that the data were collected through an online medium. Therefore, the authenticity of the responses given by the participants cannot be assured. The data were collected from some states in Kerala. Generalizability of the findings may be limited as the sample size was small when compared to the total population of emerging adults in Kerala. Hence, a similar study can be done by increasing the sample size and by making the population normal. Similar studies can be conducted using different variables, such as self-efficacy. Self-control, self-regulation, academic stress, anxiety, and depression among the population. The study can be conducted in a broader range of areas, and random sampling could increase the efficiency of the study. A qualitative method could be used to bring out various dimensions like well-being, health, and psychological outcomes for further research. Examine the relationship of the study among workplace settings to determine whether it has an impact on workplace settings. Despite all the limitations, it is hoped that the present study has provided a better understanding of the relationship between problematic smartphone use, sleep quality, and procrastination among emerging adults and may help to catalyse further research in this area.

CONCLUSION

The current study found a significant relationship between problematic smartphone use and procrastination and a significant relationship between problematic smartphone use and sleep quality among emerging adults. The study also identified problematic smartphone use as a strong predictor of procrastination.

Implications

The research can identify potential risk factors and vulnerabilities of problematic smartphone use, which contribute to procrastination behaviour within the emerging adult population. This understanding can inform targeted interventions and support strategies. This could have implications in academic, psychological, work, and health settings. Researchers might be inspired to investigate other variables that could contribute to the study, such as self-efficacy, self-regulation, academic stress, self-control, self-esteem, anxiety, and depression in emerging adults.

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Conflict of Interest
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