



# Smartphone Addiction and its Impacts on Loneliness, Happiness, and Satisfaction with Life in Medical Students with Different Personalities During COVID-19 Pandemic

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## Abstract

**Background:** In this digital era, around the globe, smartphones have become ubiquitous and an indispensable part of everyday life. Despite being a highly productive tool, smartphone is often overused or misused leading to addiction. Studies have been carried out to assess factors influencing smartphone addiction, but very little focus has been placed on psychosocial changes in adults with different personalities, especially among medical students. Hence, this study aimed to investigate the influence of smartphone addiction on personality among medical students in South India.

**Methods:** A validated extrovert and Introvert Personality Inventory (IPEI) was administered to assess the personality after obtaining the necessary permissions. Using a validated questionnaire, the satisfaction with life, subjective happiness, and loneliness scales were administered via Google Forms.

**Findings:** The results showed there was a statistically significant increase in life satisfaction and loneliness scores among the extroverts in the mobile phone addiction group compared with the non-addiction group ( $P < 0.0001$ ).

**Conclusion:** Considering the impact of cell phones on various factors in adults in different areas can complement the nationwide statistics so as to formulate a health policy to address the vulnerable population and thus prevent the deterioration of the psychosocial behavior of the young generation.

**Keywords:** Mobile phone, Introverts, Extroverts, Health impacts

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## Introduction

Despite being a highly productive tool, smartphone is often overused or misused leading to addiction. It is not uncommon to observe most people experiencing nomophobia – fear of being without a cell phone. This compulsive behavior caused by smartphones is due to the availability of games, social applications, and easy access to online resources. The same has been confirmed in 2020 by a global digital report indicating a 25% increase in internet users and a 30% increase in social media users of which a 10% (222 million) increase was observed in unique mobile and 40% (675 million) in mobile social media usage.<sup>1</sup> In developing countries like India, it is forecasted that the smartphone penetration rate (calculated using a mean number of active mobile phone users per 100 people within a specific population) which was 42% in 2020, will increase to 51% by 2025.<sup>2</sup> Addiction, a state affecting rational thinking and judgment due to constant use of or dependency on drugs/substances, now includes internet, gaming, mobile

phone usage, gambling, and other behavioral addictions.<sup>3</sup> Addiction can become a coping mechanism for both physical and emotional issues.

As the brain develops, mental maturity starts at the age of 13 to 14. It is then that self-certainty is acquired as opposed to self-doubt by experimenting with different constructive roles.<sup>4</sup> Dependency on smartphones at this age is more likely as it gives excitement and paves a way to get rid of stress. This positive anticipation of smartphones may end up in delinquency which leads to more problematic behaviors, somatic symptoms, attention deficit, aggression, and severe psychopathologies in the youth addicted to phones. If not addressed early, this may lead to serious psychosocial behavioral changes.<sup>5</sup> There are three personalities: Introverts (those who keep themselves away from society), extroverts (those who exhibit conspicuous social behavior and socialize more), and Ambiverts (people who are in between introverts and extroverts and have a balanced social life). Smartphone addiction is common in both introverts and extroverts as



in introverts there exists an exaggeration of the thought processes about directly observable social behavior, with an accompanying tendency to withdraw from social contacts.<sup>6-8</sup> Addiction to smartphones in both these personalities is closely related to personal factors as well as the sense of alienation.<sup>9,10</sup> Studies have been carried out to assess factors influencing smartphone addiction, but very little focus has been placed on psychosocial changes in adults with different personalities, especially among medical students. Hence, this study aimed to investigate the influence of smartphone addiction on introverts and extroverts

**Aim**

To study smartphone addiction and its impacts on the life coping skills of young medical students with different personalities.

**Objectives**

1. To assess loneliness score, happiness score, and satisfaction in life among introverts with regular smartphone use
2. To assess loneliness score, happiness score, and satisfaction in life among extroverts with regular smartphone use.

**Methods**

This was a cross-sectional study conducted on medical students in Mahatma Gandhi Medical College and Research Institute from October 2019 to September 2020. A validated Extrovert and Introvert Personality Inventory (IPEI) was administered to assess the personality after obtaining the necessary permissions.<sup>11</sup> The sample size was calculated using G\*Power computer software as 45 to detect a medium effect ( $d = 0.30$ ). The power of the test was set at 90% and alpha at 0.05 (Figure 1).

A total of 50 participants from each group who were willing for further assessment were screened for mobile addiction and its impacts on psychosocial factors. Simple random sampling was used to recruit the participants. Using the Smartphone Addiction Scale (SAS), the introverts and extroverts were sub-classified as smartphone addicts and non-addicts.<sup>12</sup> Coping skills of the participants were measured using satisfaction with life, subjective happiness, and loneliness scales. The questionnaires were administered using Google Forms.

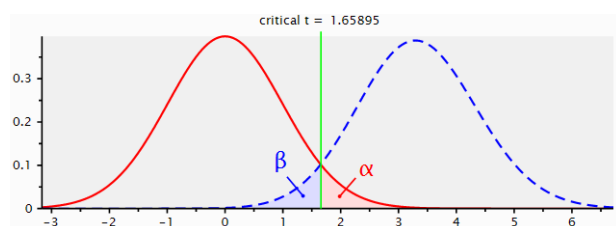


Figure 1. Sample size estimation using g power software

Each questionnaire had its reference range which helped in categorizing the participants.

Satisfaction with life was assessed using a 1-7 scale (from 1: strongly disagree to 7: strongly agree).<sup>13</sup> A 4-item scale was used to measure subjective happiness.<sup>14</sup> Loneliness was assessed based on 4 questions using a 1-5 scale (from 1: never to 5: all the time).<sup>15</sup> Curiosity and Exploration Inventory (CEI-II) was also utilized.<sup>16</sup> CEI-II is a 10-item scale with two factors: the motivation to seek out knowledge and new experiences (stretching; five items) and the willingness to embrace the novel, uncertain, and unpredictable nature of everyday life (embracing; five items). The first factor, exploration, refers to appetitive strivings for novel and challenging information and experiences. The second factor, absorption, refers to the propensity to be deeply engaged in activities. Respondents rated the items using a 7-point Likert scale. Details of participant recruitment are depicted in Figure 2.

Continuous data were represented as mean ± SD. Parametric tests were used for analysis as the data followed a normal distribution. Moreover, the chi-square test was used to compare the difference in proportion. The level of significance was set at 5%. Statistical analyses were done using SPSS software.

**Results**

**Demographic details**

A total of 220 participants were recruited for the study. Among the study participants, 157 were extroverts and 63 were introverts. Besides, 50 participants from each group who were willing for further assessment were screened

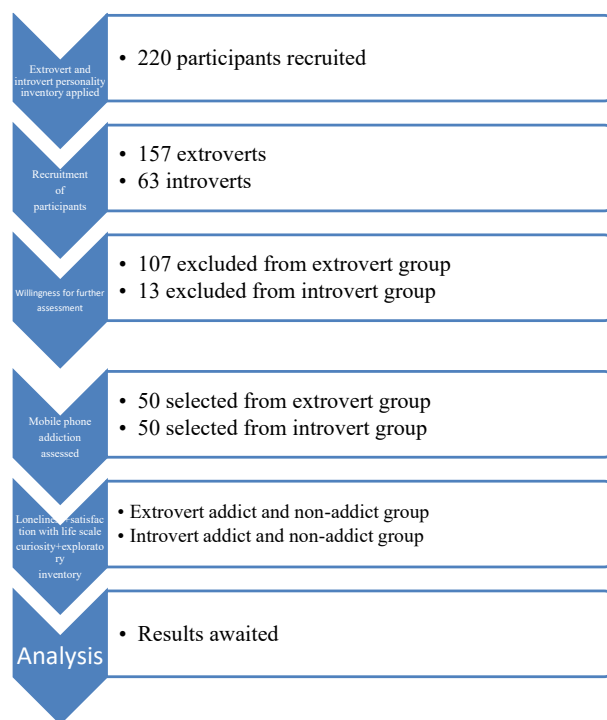


Figure 2. Patient recruitment flowchart

for mobile addiction and its impacts on psychosocial factors and the results were explained.

The age of the study participants was in the range of 18-24 years. Among the study participants in the extrovert group, 18 were male and 32 were female. In the introvert group, 22 were male and 28 were female (Table 1).

### Mobile addiction

A total of 32 study participants were addicted to mobile phones in the extrovert group and 22 were addicted to mobile phones in the introvert group (Table 2).

### Life satisfaction

There was a statistically significant increase in life satisfaction scores among the extroverts in the mobile phone addiction group compared with the mobile non-addiction group ( $P < 0.0001$ ). Similarly, the life satisfaction score was significantly higher among the introverts in the mobile phone addiction group compared with the mobile non-addiction group ( $P < 0.05$ ) (Table 3).

Moreover, 100% of the study participants were satisfied with life in the extrovert mobile phone addiction group whereas only 64% of the study participants were satisfied with life in the mobile phone non-addiction group. Similarly, 49% of the study participants were satisfied with life in the introvert mobile phone addiction group whereas only 43% of the study participants were satisfied with life among the mobile phone non-addiction group (Table 4).

### Subjective happiness

There was no statistically significant change in subjective happiness score between mobile phone addiction and non-addiction groups (Table 5).

**Table 1.** Gender distribution of the study participants

	Male	Female
Extrovert	18	32
Introvert	22	28

**Table 2.** Comparison of mobile phone addiction between two groups

	Mobile phone addiction	
	Yes	No
Extrovert	32	18
Introvert	22	28

**Table 3.** Comparison of life satisfaction score between groups

	Mobile phone addiction	Life satisfaction score (Mean $\pm$ SD)	P value <sup>a</sup>
Extroverts	Addicted	28.3 $\pm$ 3.02	0.0001*
	Non-addicted	22.8 $\pm$ 4.9	
Introverts	Addicted	22.2 $\pm$ 6.08	0.05*
	Non-addicted	18.7 $\pm$ 7.88	

$P < 0.05$  statistically significant; <sup>a</sup> Independent t-test.

Furthermore, 46% of the study participants were happy with life in the extrovert mobile phone addiction group, and only 48% of the study participants were satisfied with life in the mobile phone non-addiction group. Similarly, 28% of the study participants were satisfied with life in the introvert mobile phone addiction group whereas only 25% of the study participants were satisfied with life among the mobile phone non-addiction group (Table 6).

### Loneliness

There was a statistically significant increase in loneliness score in the extrovert mobile phone non-addiction group compared to the extrovert mobile phone addiction group ( $P < 0.05$ ). There was no significant difference in loneliness score among the introvert group (Table 7).

In addition, 16% of the study participants felt lonely in the extrovert mobile phone addiction group whereas 64% of the study participants felt lonely in the mobile phone non-addiction group. Similarly, 40% of the study participants felt lonely in the introvert mobile phone addiction group and 78% of the study participants felt lonely among the mobile phone non-addiction group (Table 8).

### Curiosity and exploration

There was no statistically significant change in CEI score among mobile phone non-addicts (Table 9).

Besides, 100% of the study participants were curious and exploratory in the extrovert mobile phone addiction group whereas 96% of the study participants were curious and exploratory among the mobile phone non-addiction group. Similarly, 96% of the study participants were curious and exploratory in the introvert mobile phone addiction group whereas 92% of the study participants were curious and exploratory among the mobile phone non-addiction group (Table 10).

**Table 4.** Comparison of proportion of life satisfaction between groups

	Mobile phone addiction	Life satisfaction		P value <sup>a</sup>
		Yes (%)	No (%)	
Extroverts	Addicted	100	0	0.001*
	Not addicted	64	36	
Introverts	Addicted	49	41	0.67
	Not addicted	43	57	

$P < 0.05$  statistically significant; <sup>a</sup> Chi-square t-test.

**Table 5.** Comparison of subjective happiness score between groups

	Mobile phone addiction	Subjective happiness score (mean $\pm$ SD)	P value <sup>a</sup>
Extroverts	Addicted	20.9 $\pm$ 2.9	0.09
	Not addicted	19.5 $\pm$ 2.7	
Introverts	Addicted	17.5 $\pm$ 3.6	0.46
	Not addicted	18.3 $\pm$ 4.7	

$P < 0.05$  statistically significant; <sup>a</sup> Independent t-test.

**Table 6.** Comparison of proportion of subjective happiness between groups

	Mobile phone addiction	Subjective happiness		P value <sup>a</sup>
		Yes (%)	No (%)	
Extroverts	Addicted	46	44	0.85
	Not addicted	48	52	
Introverts	Addicted	28	72	0.81
	Not addicted	25	75	

P<0.05 statistically significant; <sup>a</sup> Chi-square t-test.

**Table 7.** Comparison of loneliness score between groups

	Mobile phone addiction	Loneliness (Mean±SD)	P value <sup>a</sup>
Extroverts	Addicted	5.6±2.8	0.0001*
	Not addicted	8.7±1.9	
Introverts	Addicted	8.6±3.1	0.12
	Not addicted	9.9±2.6	

P<0.05 statistically significant; <sup>a</sup> Independent t-test.

**Discussion**

This cross-sectional study conducted on medical students showed mobile phone addiction had a significant impact on psychosocial changes. In the present study, the prevalence of mobile phone addiction was found to be about 50%. Previous studies have reported mobile phone addiction in the range of 7%–34% among adolescents and college students.<sup>17</sup> There was a statistically significant increase in life satisfaction scores among the extroverts in the mobile phone addiction group compared with the mobile non-addiction group. Moreover, 46 % of the study participants were happy with life in the extrovert mobile phone addiction group while 28% of the study participants were satisfied with life in the introvert mobile phone addiction group. This clearly shows that life satisfaction score was higher in the addicted group among both extroverts and introverts. The life satisfaction percentage was less in the addiction group when compared to the non-addiction group. In a similar vein, the findings of the study by Samaha et al. showed higher level of mobile addiction was commonly associated with high perceived stress and low satisfaction with life scores.<sup>18</sup> The present study did not focus on the effects of recent stressful life events or perceived stress among the students. Interpersonal relationship stress, family life stressors, academic stress, love tension, and career pressure tend to influence smartphone addiction and life satisfaction.<sup>19,20</sup> Similar studies were found in the literature including the study by Negi and Godiyal.<sup>21</sup> There was no statistically significant change in subjective happiness score between mobile phone addiction and non-addiction groups. However, there was a difference in the number of participants with subjective happiness score. A study by Pandya et al highlighted that the common causes of using mobile phone were education, web surfing, social networking, and gaming. This finding has an impact on the loneliness score as social media surfing is

**Table 8.** Comparison of proportion of loneliness between groups

	Mobile phone addiction	Loneliness		P value <sup>a</sup>
		Yes (%)	No (%)	
Extroverts	Addicted	16	84	0.0006*
	Not addicted	64	36	
Introverts	Addicted	40	60	0.005*
	Not addicted	78	22	

P<0.05 statistically significant; <sup>a</sup> Chi-square t-test.

**Table 9.** Comparison of Curiosity and Exploration Inventory scores between groups

	Mobile phone addiction	Curiosity and exploration inventory (Mean±SD)	P value <sup>a</sup>
Extroverts	Addicted	40.7±6.9	0.515
	Not addicted	39.4±6.4	
Introverts	Addicted	35.2±7.7	0.33
	Not addicted	37.4±8.1	

P<0.05 statistically significant; <sup>a</sup> Independent t-test.

**Table 10.** Comparison of proportion of Curiosity and Exploration Inventory between groups

	Mobile phone addiction	Curiosity and Exploration Inventory (%)		P value <sup>a</sup>
		Yes (%)	No (%)	
Extroverts	Addicted	100	0	0.56
	Not addicted	96	4	
Introverts	Addicted	96	4	0.5
	Not addicted	96	8	

P<0.05 statistically significant; <sup>a</sup> Chi-square t-test.

done to combat loneliness. This can be considered as a confounding variable concerning loneliness scores in the current study.<sup>22</sup>

Two hypotheses were posed in regard to loneliness. The first suggests that smartphone use tends to isolate the individuals from the real world by making them lonely. On the contrary, the cognitive behavioral model for pathological internet use (PIU) states that loneliness predisposes to PIU. The second hypothesis suggests that loneliness has a higher impact on PIU than depression.<sup>23</sup> This finding is contrary to that of the present study which poses a statistically significant increase in loneliness score in the extrovert mobile phone non-addiction group compared with the extrovert mobile phone addiction group. In addition, 100% of the study participants were curious and exploratory in the extrovert mobile phone addiction group whereas 96% of the study participants were curious and exploratory among the mobile phone non-addiction group. Similarly, 96% of the study participants were curious and exploratory in the introvert mobile phone addiction group, and 92% of the study participants were curious and exploratory in the mobile phone non-addiction group. This clearly shows mobile phone addiction did not have an impact on curiosity

and inventory score in both groups. Similar results were obtained in previous studies.<sup>24</sup> The present study was the first of its kind in South India to assess the impact of mobile phone addiction on psychosocial changes among young adults. Although it is evident that adolescent mental health has been associated with mobile phones in recent days, we cannot rule out the other confounding factors.<sup>25</sup> The usage of mobile phones in India is a new concept.<sup>26</sup> The introduction of media (mobile phones) and its effects on the psychosocial life of media users is a neglected area of research. Mahakud and Bhola proved the effect of mobile phone usage on the physical and mental health of the metro adolescent population.<sup>26</sup> Still, it is important to investigate the usage of different mass media such as mobile, internet, TV, and other media gadgets as well as the effects of different mass media on the wellbeing of mass media users. Due to the COVID-19 pandemic, classes were held online which might increase the risk of mobile phone addiction among the vulnerable population causing a change in psychosocial behavior. Further steps need to be taken in the future to prevent such change which may help improve the quality of life.

### Conclusion

With mobile phone usage becoming inevitable in the current era, further studies with larger samples are needed to get the nationwide statistics to materialize a health policy in order to address the vulnerable population, which may prevent the deterioration of psychosocial behavior in the younger generation.

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### Authors' Contribution

**Conceptualization:** Jeneth Berlin Raj, Krishnan Srinivasan.

**Data curation:** Krishnan Srinivasan.

**Formal analysis:** Krishnan Srinivasan, Vishnupriya Veeraraghavan.

**Methodology:** Jeneth Berlin Raj, Krishnan Srinivasan, Vishnupriya Veeraraghavan.

**Project administration:** Jeneth Berlin Raj, Krishnan Srinivasan.

**Resources:** Jeneth Berlin Raj, Krishnan Srinivasan.

**Software:** Jeneth Berlin Raj, Krishnan Srinivasan, Vishnupriya Veeraraghavan.

**Validation:** Jeneth Berlin Raj, Krishnan Srinivasan, Vishnupriya Veeraraghavan.

**Visualization:** Jeneth Berlin Raj, Krishnan Srinivasan, Vishnupriya Veeraraghavan.

**Writing—original draft:** Jeneth Berlin Raj, Krishnan Srinivasan, Vishnupriya Veeraraghavan.

**Writing—review & editing:** Jeneth Berlin Raj, Krishnan Srinivasan, Vishnupriya Veeraraghavan.

### Ethical Approval

Institutional Review Committee (IRB) and Institutional Ethical Committee (IEC) clearance was obtained from the institution before the commencement of the study (Ethics No. MGMCRI/IEC/2019/53) and informed consent was obtained from the participants.

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