

## A detailed investigation and study on students' dependence on mobile phones (damages and solutions) and creating behavioral and academic disorders for them

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### Abstract

A mobile phone (or cellphone[a]) is a portable telephone that can make and receive calls over a radio frequency link while the user is moving within a telephone service area, as opposed to a fixed-location phone (landline phone). We know that even thousands of years ago, people used to sit around the fire and tell each other stories, and in this way deeper relationships were formed; Something that can be considered as an example of a social network. But what has made social networks in the center of attention more than ever before is the development of information technology and digital infrastructure. If in the past social networks were only formed on the scale of neighborhoods and cities, today with the cheap access to digital tools (Internet, mobile and software), a large part of people on the planet can expand their communication network regardless of time and place. Social network is a term for sites and applications that focus on creating communication and community formation between people online. A social network is a social structure composed of groups (generally individual or organizational) that are connected by one or more specific types of affiliation such as ideas and financial exchanges, friends, relatives, web links, and disease transmission (epidemiology). The analysis of social networks looks at social relations with the terms ras and yal. In other words, in the simplest form, a social network is a mapping of all the related edges between the studied vertices. The vertices are the individual actors in the networks and the edges are the relationships between these actors. Many types of edges can exist between vertices. Today, social networks have become an integral part of most users' lives. These networks not only have a deep impact on the social aspects of users in various societies, but also have many applications in various fields. On the other hand, the increasing use of computer technology and the widespread penetration of the Internet have made many people, especially students, face mental health and social communication disorders caused by cyberspace addiction. The purpose of this study was to investigate the harmful use and type of use of mobile phones in high school students and its relationship with academic performance and motivation to progress.

**Keywords:** Smartphone addiction, Technology addiction, Learning, Mental health, Meta-analysis.



## Introduction

The term social network was used for the first time, as Webster says, in 1854; That is, more than a century and a half ago. Naturally, at that time, social network did not mean tools like Instagram, Twitter, and LinkedIn, but it was used to describe a network of people who have friendship and relationship with each other. If we want to go one step further and get closer to today's concept of social network, we should mention John Barnes. This Australian sociologist used the term social network in 1954 in one of his articles. He saw the social network as a "network"; In the same sense as we understand. That is, he saw people as nodes in a graph with multiple lines of communication between them (each person is a friend and has a relationship with one or more other people).

Social media is an interactive technology that allows different people to share their words, thoughts, ideas and information through communication and virtual infrastructures such as the Internet. Today, most social networks work on the Internet, so the simpler definition of a social network is as follows: a tool that allows users to communicate on the Internet. This communication can include sending text, file, video and photo. Users can access social networks through personal computers, tablets and mobile phones.

Information and communication technology in general and mobile phone in particular, since its rapid growth (late 1990s), has found a powerful place in human individual and social life and has become a youth technology. Young people are the main consumers of mobile technology and are often considered as the pioneers of its adaptation and evolution. According to young people, mobile phone is considered the most important means of communication in daily life and today it has become a private means of communication. Through mobile phones, young people can manage their affairs and connect to the immediate circle of family and friends. Mobile phones form a huge part of the identity elements of young people, so that you can understand their personality and identity through the color of the phone, images, music or files they have on their mobile phones (Kalantari and Hosni, 2017).

The use of mobile phones, not only in young people but also in teenagers, is considered as an almost necessary part of daily life (Ishii, 2011). Extensive research conducted in 2007 has shown that the mobile phone is the most essential communication medium for teenagers. When respondents were asked about their essential communication medium, 40% of respondents in the 13-18 age range chose a cell phone, while 22.9% chose a television and 10.3% chose a personal computer. did (Nibin, Shirishi and Troy, 2008). Based on the research conducted in 2006, 27.3 percent of primary school students (age range 10 to 12 years), 53.4 percent of middle school students (13 to 15 years), and 95.2 percent of High school students (16-18 years old) had cell phones (Directorate General of Community Policy, United Community, 2007).

The significant growth of mobile phone use and especially its increasing prevalence among teenagers has created increasing concerns among many experts about the harmful effects of mobile phones (Ishii, 2011).

With the fast advancement of data innovation, the Web furthermore time has continuously coordinates into all viewpoints of our lives. Increasingly individuals are utilizing web based applications and gadgets. Whereas giving comfort, the web can too lead to over the top reliance

and indeed compulsion. The investigate on tricky utilize of web incorporates two perspectives, common and particular web habit. Particular web habit emphasizes centering on particular exercises on the web, whereas common web enslavement emphasizes locks in in all every day exercises on a specific gadget or web [1]. A smartphone may be a common term for a sort of portable phone that has an autonomous working framework, free running space, and can be introduced by clients on their claim by third-party benefit suppliers, and can accomplish remote organize get to through versatile communication systems [2, 3]. Hence, smartphone compulsion can be seen as a sort of common web enslavement [4,5,6,7]. The 51st Factual Report on Web Advancement in China discharged by the China Web Organize Data Middle (CNNIC) appears that as of December 2022, the number of portable phone Web clients in China come to 6.5 billion, and the extent of Web clients utilizing smartphone to get to the Web was 99.8 percent [8]. A few researchers have found that smartphone habit is identified at a tall rate among college understudies, with the rate of smartphone addiction among Chinese college understudies coming to 21.3% [9], a cross-culturally steady finding, with 36.4% of college understudies in South Korea enduring from long-term smartphone compulsion [10], and in Saudi Arabia, the rate of smartphone enslavement location among college understudies is as tall as 48.0% [11].

Smartphone habit, too known as risky smartphone utilize, alludes to addictive behavior in which people are incapable to control their smartphone utilization, driving to impeded physical, psychological, and social working [12, 13]. Chóliz [14] anticipated that smartphone compulsion would be one of the foremost significant addictive behaviors within the twenty-first century, making it a hot point for researchers. Thus, analysts have conducted various thinks about on the predictors and negative impacts of smartphone habit to supply direction for prevention and intervention [15]. Ran et al. [16] found that social uneasiness may be a noteworthy indicator of smartphone enslavement in both youths and grown-ups. In this manner, it ought to be considered when planning intercession programs for these age bunches.

For thinks about related to the results of smartphone compulsion, comes about appear that smartphone compulsion leads to diminished rest quality [17, 18], impeded cognitive working [19, 20] diminished scholarly inspiration and thus lower grades [21, 22], and development of negative feelings such as uneasiness, misery, and depression [23,24,25,26]. In later a long time, a few analysts have contended that a few components such as self-control and depression, which are both predecessors of smartphone enslavement, are moreover influenced and are results of smartphone habit [15]. In this manner, investigate on smartphone enslavement ought to not as it were center on investigating the relationship between smartphone enslavement and related variables but too explore their intelligent. Organize examination, as an emerging research method, permits for diverse factors to be set into the same visual arrange demonstrate to reveal the intuitive between factors [27,28,29]. This paper embraces arrange investigation approach to investigate the intelligent between college students' smartphone habit and related components. Its point is to distinguish the center factors influencing college students' smartphone enslavement.

## Hypothesis development and determination of impacting variables

### Interaction of Person-Affect-Cognition-Execution demonstrate (I-PACE demonstrate)

The I-PACE demonstrate, proposed by Brand et al. [30], could be a prepare show appropriate to different addictive behaviors [31]. It has been broadly utilized in smartphone habit investigate in later a long time [32,33,34]. This show states that particular Web utilize clutters are the result of

the interaction of center person characteristics (counting psychopathology, identity, social cognition, etc.), affective-cognitive responses, satisfaction, official and control capacities [30]. That's to say, person characteristics, affective-cognitive reactions, delight, official and control capacities are considered as activating factors, whereas particular organize utilization boundaries are considered as result factors. It is worth noting that within the I-PACE demonstrate, particularly within the early stages of enslavement arrangement, the choice behavior of utilizing particular applications or websites may bring short-term positive encounters and fulfillment. In this manner, an individual's current or past mental wellbeing status (such as mental trouble) can affect the tricky utilize of online exercises, driving to an increment in screen time and habit [35,36,37].

### **The arrange hypothesis of mental clutters**

The Network Hypothesis of Mental Clutters, proposed by Borsboom [27], proposes that mental disarranges emerge from causal interactions between indications through physical, mental, and social components. On the off chance that these intelligent are solid sufficient, psychopathological symptoms will produce a certain degree of criticism and self-sustaining, driving to a jumbled state of the arrange, to be specific mental clutter.

For mental clutter intercessions, it is vital to center on the status of the center indications within the organize in arrange to alter the structure of the arrange distribution. Jones, Heeren, & McNally [38] extended on this theory by adding that the hubs within the organize of mental disarranges are not constrained to fair the indications, but that natural, cognitive, or other individual-level forms can trigger mental disorders.

### **Interaction of I-PACE demonstrate with the arrange hypothesis of mental clutter and determination of powerful components**

The I-PACE demonstrate uncovers a wide run of variables influencing smartphone addiction from a handle point of view, but a few researchers have contended that the show needs an investigation on the designs of intuitive between the components [39]. The arrange hypothesis of mental disarranges, which centers on causal intuitive, supports the thought of this ponder to join the factors included within the I-PACE demonstrate into the arrange of mental clutters and to explore the interactions between them. Based on the Interaction of the I-PACE show and combining past studies, the present creator recognized the factors social uneasiness, self-esteem, and comprehending social back as center person characteristics [30], fear of lost out, scholarly burnout, and hesitation practices as emotional-cognitive receptive variables influencing smartphone habit [39,40,41], delight as well as official and control functions chosen for life fulfillment and self-control [30, 42].

### **Organize examination**

Network analysis is based on the organize hypothesis of mental disorder by putting diverse identity characteristics, impacts, and indications, among others, within the same visual arrange in arrange to evaluate the complex connections and intelligent between them [28, 29, 43]. Hubs in a network speak to watched factors, and edges interfacing hubs speak to factual connections between watched factors [28]. In later a long time, analysts have utilized organize examination to construct networks

of relationships between various factors or indications to investigate complex mental developments, and this approach has also been broadly utilized in the field of smartphone enslavement investigate. For case, Li et al. [44] utilized organize investigation to get it the interrelationships between lost uneasiness, smartphone enslavement, and social networking site utilization. It has too been found that misfortune of control and abuse are center symptoms of smartphone habit [45]. Most of these considers are based on cross-sectional information at a given time and can outline interrelationships between factors or side effects, but caution is required with respect to causal deductions. Rhemtulla et al. [46] created cross-lagged board organize examination utilizing cross-lagged board information in conjunction with network investigation. This strategy can uncover the longitudinal forms that happen inside and over structures over time [47]. In the interim, cross-lagged board organize can affirm the stronger impact of center hubs on other hubs, demonstrating the enactment part of core hubs within the whole organize [48, 49].

### The objective of this think about

This think about is guided by the I-PACE show and the arrange hypothesis of mental clutter, and employments cross-sectional and cross-lagged board arrange models to analyze college students' smartphone compulsion and its related influencing components. The think about inspected smartphone habit and its affecting variables, counting individual center characteristics, affective and cognitive reactions, delight, executive and control capacities. The primary objective of this ponder is to investigate the transverse relationship and vertical prediction relationship between smartphone enslavement and related impacting factors among college understudies. This paper points to recognize the center components among these related affecting factors through some central pointers, and give more specific suggestions for long-standing time intercession of smartphone enslavement in college understudies.

### Strategies

#### Members

This ponder managed a survey overview to first-year understudies in a indicated territory of China in early October 2022 and at the end of Walk 2023. The overview was conducted utilizing cluster testing based on colleges as the unit of examination. The show creator reached advocates from multiple colleges at a college, laying out the study's goals and disseminating electronic advertisements to enlist participants. At the same time, members will be educated around the compensate they will get for their participation in the think about to incentivize them to require portion. In ensuing thinks about, the creator reached participants who took portion within the unique study using the same way. All members completed the study on the Wenjuanxing stage, a predominant Chinese survey website. The think about requires participants to have smartphones or computers with web get to and get it the pertinent questionnaire's content.

There were 1802 participants participating within the to begin with test and 1678 within the moment test, and the present author matched the information gotten from the two organizations based on statistic factors such as the participant's name, date of birth, etc., and prohibited the surveys with consecutive unchanging reactions and as well numerous lost answers. A add up to of 1564 college understudies were included within the investigation, counting 854 male and 710 female, with a cruel age of 19.14 a long time ( $SD = 0.66$ ). All participants gave their educated



assent for consideration some time recently they taken part within the study. The study was conducted in understanding with the Declaration of Helsinki, and the convention was endorsed by the Morals Committee of the university (Number:LL2023060).

## Estimations

### Smartphone enslavement scale for college understudies

Su et al. [50] developed a smartphone habit scale suitable for Chinese university understudies, which has been broadly utilized by Chinese analysts [51, 52]. The scale contains 22 things and 6 measurements:

withdrawal conduct, salience behaviour, social consolation, negative impacts, utilize of application, and reestablishment of application. In this think about, Cronbach's  $\alpha$  was 0.917, 0.943 for both measures.

### Aitken lingering stock

The Chinese adaptation of the Delaying Behaviour Questionnaire was created by Aitken et al. [53] and interpreted and revised by Chen et al. [54], which was utilized in this consider. The scale comprises of 19 items, of which 2, 4, 7, 11, 12, 14, 16, 17 and 18 are switch scored and items are evaluated utilizing a scale from one (totally non-compliant) to five (completely compliant), with higher add up to scores demonstrating higher delaying conduct. Cronbach's  $\alpha$  was 0.846 and 0.806, individually.

### Learning burnout scale

This think about utilized the Learning Burnout Scale for College Understudies [55] to measure scholarly burnout among college understudies, which consists of a 20-item self-report scale with things 1, 3, 6, 8, 11, 13, 15, and 18 are contrarily scored. The scale incorporates three measurements:

sad, disgraceful conduct and diminished individual achievement. Higher scores demonstrate higher scholarly burnout. Each item is evaluated on a five-point Likert scale from 1 (totally non-compliant) to 5 (completely compliant). Cronbach's  $\alpha$  of the scale in this think about was 0.886, 0.835.

### Self-control scale

Self-control was measured through the Self-Control Scale created by Tangney et al. [56] and localized and reexamined by Tan et al. [57]. The scale incorporates 19 things and 5 dimensions:

motivation control, healthy habits, resisting enticement, centered work, and abstinence from excitement. These things were assessed employing a 5-point Likert scale. Higher scores reflect more noteworthy self-control. Cronbach's  $\alpha$  was 0.822 and 0.812 for the two time point measures.

### **Fear of lost out scale**

The Fear of Missing Out Scale [58] incorporates 8 things and 2 measurements: fear of lost out on data and fear of lost out on a circumstance. Things were scored on a 5-point Likert scale, with higher scores showing a more prominent fear of lost out, and Cronbach's  $\alpha$  was 0.814 and 0.850 for the two time point measures.

### **Social evasion and trouble scale**

In this consider, the Social Evasion and Trouble Scale was utilized to degree the social uneasiness of later college understudies. Peng et al. [59] reexamined the scale, which is suited for Chinese college understudies, contains 15 questions, and employments a 5-point Likert scale. Switch scored things included: 3rd, 6th, 10th, and 15th. Cronbach's  $\alpha$  was 0.853 and 0.839 for the two time point measures.

### **Seen social bolster scale**

Jiang [60] reexamined the Collaborative Social Bolster Scale created by Zimet [61] and others, which has great unwavering quality and legitimacy among Chinese college understudies, with 12 things, counting 3 measurements of family back, companion back, and other back, and could be a 7-point Likert scale, with Cronbach's  $\alpha$  was 0.941 and 0.961 for the two time point measures.

### **The fulfillment with life scale**

The Fulfillment with Life Scale was created by Diener [62], interpreted and reexamined by Qiu [63], which was utilized to degree the life fulfillment of college understudies. The scale has five items, each of which is scored employing a 7-point Likert scale. The Cronbach's  $\alpha$  for this scale in this consider were 0.874 and 0.876.

### **Self-esteem scale**

In this ponder, the display creator utilized the Self-Esteem Scale created by Rosenberg [64] and received by Zhou [65] to degree the self-esteem level of Chinese college understudies, which has 10 things with invert scoring counting questions 3, 5, 8, 9 and 10. Cronbach's  $\alpha$  was 0.861 and 0.826 for the two time point measures.

### **Explanatory strategy**

Information collected on smartphone compulsion and related variables among college understudies were expressively analyzed utilizing SPSS 26.0 and relationship heatmaps for each variable were delivered utilizing corrplot work bundle of the R computer program bundle (adaptation 4.3.0). Both the cross-sectional arrange examination as well as the cross-lagged board arrange investigation utilized the qqgraph package for arrange displaying [66, 67]. All systems are based on the amplified bayesian data basis [54], which utilizes the graphical slightest outright shrinkage and determination administrator (GLASSO) to expel pitifully associated edges, getting moo complexity and tall precision arrange show [68].

Within the cross-sectional arrange examination, the display creator developed two systems at T1 and T2, and for a clearer and more natural comparison, the show creator chose the "circle" dissemination to settle the same hubs of the two systems at the same position. For the center hubs, this paper employments quality as a central metric for assessment. Quality centrality is the entirety of the supreme values of the quality of a node's associations to other hubs, showing the node's coordinate impact on the other hubs within the organize [43], and a tall quality centrality demonstrates that the hub is at the core of the organize. Within the cross-lagged board arrange investigation, regularized relapse estimation utilizing the R bundle glmnet [69] was utilized to develop a cross-lagged board arrange with each of the factors at T1 as a indicator variable and the variable at time T2 as an result variable. The centrality measures of the factors incorporate In-strength and Out-strength. The In-strength is the whole of the coordinate impact of a hub in T2 by other hubs in T1, and is the degree to which this hub is anticipated by other nodes within the arrange. Out-strength, on the other hand, is the whole of the direct influence of a hub in T1 on the other hubs in T2, indicating the degree to which that hub predicts the other hubs within the arrange [70, 71].

At last, the precision and steadiness of the T1 and T2 systems were assessed utilizing the R work bundle bootnet [28, 72], individually, the relationship steadiness coefficient and 95% certainty interims (CI) for edge weights determined by utilizing the nonparametric bootstrap strategy (bootstrap test of 1000) separately.

## Result

### Descriptive measurable investigation

the implies, standard deviations, and relationships of all factors in this ponder. In general, smartphone habit among college understudies was direct on both measures. The seriousness of smartphone enslavement was emphatically connected with hesitation practices, scholarly burnout, fear of lost out, social uneasiness, and self-esteem. Self-control, seen social back, and life fulfillment contrarily related smartphone compulsion.

### Cross-sectional organize examination

The comes about of the cross-sectional organize examination of smartphone habit and its related variables at T1 and T2 are appeared. The comes about of organize stability show that the central steadiness coefficient of hub quality concerning college students' smartphone compulsion and its related components at T1 and T2 is 0.75, and the arrange of college students' smartphone addiction and its related components is steady and incorporates a near interaction. there are 9 hubs and 26 non-zero edges within the arrange, hub 3 (scholarly burnout) and hub 4 (self-control) are at the center of the organize and have moderately tall quality centrality (Strength = 1.15, 0.98). The most grounded edge qualities ( $r = -0.42$ ) existed between node 3 (scholastic burnout) and hub 4 (self-control). The hubs straightforwardly related with hub 1 (smartphone enslavement) incorporate hub 2 (delaying conduct), hub 3 (scholarly burnout), hub 4 (self-control), hub 5 (fear of lost out), node 6 (social uneasiness), and hub 7 (seen social back). Among them, node 4 (self-control) is the foremost directly related ( $r = -0.23$ ).





there are 9 hubs and 32 non-zero edges within the organize, hub 7 (perceived social back) and hub 4 (self-control) have tall centrality of quality (Strength = 1.44, 1.37), which is at the center of the organize.

### Cross-lagged panel network examination

the cross-lagged board arrange estimations of smartphone enslavement and related components among college understudies from T1 to T2. Each variable incorporates a solid autoregression, and hub 1 (smartphone compulsion) has the biggest autoregressive coefficient ( $r = 0.49$ ). To make the cross-lagged ways of the factors clearer, the evaluated cross-lagged board organize after covering up the autoregressions is appeared. The comes about appeared a clear relationship between hub 1 (smartphone compulsion) and hub 3 (scholastic burnout), hub 4 (self-control), and hub 6 (social anxiety). The hubs that have a coordinate impact on hub 1 (smartphone compulsion) are hub 2 (hesitation conduct), hub 3 (academic burnout), hub 4 (self-control), hub 5 (fear of lost out), hub 6 (social uneasiness), and hub 9 (self-esteem), among them the most grounded way of relationship existing with hub 3 (scholastic burnout).

the centrality estimations from the cross-lagged panel network model with respect to smartphone habit and its related variables among university understudies from T1 to T2. The comes about appear that hub 1 (smartphone compulsion), hub 7 (seen social bolster) and hub 9 (self-esteem) are the center hubs in the network. Hub 1 (smartphone habit) and node 7 (seen social bolster) have tall in-strength inputs and are vital result factors within the arrange, and node 9 (self-esteem) has the most elevated out-strength and is an imperative indicator variable.

### Talk

#### The correlation between smartphone compulsion and influencing components among college understudies

The show think about, based on network analysis of cross-sectional and longitudinal information, uncovers the particular part of smartphone habit and its connects among college understudies. Cross-sectional organize investigation of T1 and T2 uncovered the strongest interrelationship between smartphone enslavement and self-control. Past ponders have found that self-control plays a coordinate or backhanded part in the components of smartphone habit onset [73,74,75,76]. Our consider expands these discoveries and proposes a negative relationship between self-control and smartphone habit. Self-control is related with the onset of smartphone enslavement, and smartphone habit can also lead to a diminish in an individual's self-control. The dual-systems theory of self-control [77] and the vitality demonstrate of self-control [78] support the comes about of this ponder. On the one hand, the inhibitory framework plays an imperative part when college understudies are stood up to with the allurements of a smartphone, meaning that tall self-control will offer assistance individuals resist over the top smartphone utilize [76]. On the other hand, college understudies enduring from smartphone addiction for a long period of time can lead to exhaustion of mental assets, which eventually reduces university students' self-control [79].

In expansion, scholastic burnout and self-control were the core factors within the organize of smartphone habit and its relates among college understudies in T1. In any case, in T2, seen social bolster and self-control had the most noteworthy impact on the generally arrange. This recommends that centering on these center variables changes the structure of the arrange to a more

noteworthy degree [43]. It moreover demonstrates that cross-sectional networks change over time, driving to distinctive deductions from the center hubs within the arrange. Advance clarification of these discoveries requires longitudinal information [80].

### **The causal relationship between smartphone compulsion and influencing components among college understudies**

In the cross-lagged board network, the present think about centered on the degree to which smartphone addiction was initiated by other factors in the organize. It was found that delaying behavior, scholarly burnout, self-control, fear of lost out, social uneasiness, and self-esteem all straightforwardly predicted smartphone habit, reliable with past studies [26, 81,82,83,84]. The show creator deciphered this result utilizing the comprehensive way show, which suggests that there are three paths driving to smartphone addiction. The primary pathway is the intemperate consolation pathway, and it is by and large acknowledged that smartphone habit happens more regularly in people with moo self-esteem and social anxiety, who need the appropriate sense of security and utilize their smartphones too much as a way of keeping up connections with others and looking for offer assistance. The moment pathway is the rash pathway, a pathway that contends that smartphone enslavement is due to an individual's low impulse control and need of arranging. The third pathway is the open pathway, which clarifies smartphone compulsion as an individual's frequent utilize of smartphone due to solid social motivation, recommending that fear of lost out actuates smartphone enslavement in college understudies [13, 85, 86]. Furthermore, smartphone habit predicts self-control, scholastic burnout, social uneasiness, and seen social support in college understudies, steady with past considers. Achangwa et al. [87] found that smartphone compulsion among college understudies adversely affects their physical, mental, and enthusiastic wellbeing, scholastic execution, and social intuitive.

With respect to the central part of self-esteem on smartphone habit among college understudies, Billieux et al. [12] found that people with moo self-esteem are more inclined to interpersonal trouble in genuine life and have a more noteworthy require for emotional security. This need is satisfied through smartphone communication, driving to smartphone enslavement [88]. In this manner, treatment and mediation for smartphone compulsion among college understudies ought to center on self-esteem.

### **Conclusions**

Self-control, academic burnout, social uneasiness, and smartphone habit have a commonly predictive relationship, both as predecessors to the arrangement of smartphone habit additionally as results of its creation. The center impacts on smartphone compulsion incorporate self-control, self-esteem, scholarly burnout, and seen social back. Future anticipation and mediation for smartphone enslavement ought to center on these impacts, which may be more cost-effective than other implies.

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