Research Report

ASSOCIATION OF SOCIAL NETWORKING SYSTEM USE WITH MENTAL HEALTH AND WELL-BEING: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Social Networking Systems (SNS) are web-based services integral to global communication and social interaction. This study explores predictors of smartphone addiction, the role of motivation and psychosocial well-being, and the prevalence and predictive role of anxiety and depression in smartphone addiction. **Materials and Methods:** This survey-based study used Google Forms to collect data through a predesigned questionnaire and other standardized scales. It was conducted over five days and shared through various SNS platforms. **Results:** 78.69% identified themselves as netizens and 38.5% met the criteria for smartphone addiction, which was used as a window to assess SNS use. The psychological well-being scale scores were higher in participants without smartphone addiction. Higher scores in personal growth (p=0.001), environmental mastery (p=0.02), and self-acceptance (p=0.002) were significantly associated with lower smartphone addiction. Personal growth subscale and Behavioural Inhibition System Scores were statistically significant predictors for smartphone addiction. A significant association was found between depression levels and smartphone addiction**.** **Conclusion:** Individuals struggling with psychosocial well-being, low self-acceptance, lack of control over their environment, and inadequate coping skills for personal growth are likely to use SNS as a refuge. Depression needs to be ruled out while exploring smartphone addiction.

Keywords: Social Networking System, Depression, Anxiety, Psychosocial Well-being, Behavioural Inhibition System

INTRODUCTION

Social Networking Systems (SNS) are 'web-based services that allow individuals to construct a public or semi-public profile within a bounded system, articulate a list of other users with whom they share a connection, view and traverse their list of connections and those made by others within the system[1]. Social media is a platform for communication, and social networking is an activity that creates a network of people through social media platforms. Globally, 4.9 billion people, primarily Millennials and Gen Z, use SNS[2]. India has the highest average number of SNS accounts held by a person, which is 11.5 per user[2]. Social networking sites are central to the digital revolution, shaping our thinking, communication, and global interactions. According to Jung et al. [3], the consensus remains that social media can harm users' physical, psychological, social, and financial aspects. Jung also identified predictors of smartphone addiction, including female gender, weekend average usage hours, personality traits related to pursuing desired goals, positive responses to anticipated rewards, dysfunctional impulsivity, and low self-control. [3]

The concerns of mental health professionals about the potential negative impact of social media use, such as Problematic Internet Use (PIU) and Internet Addiction Disorder (IAD), parallels the growth in internet access. [4] Young conceptualized Internet addiction as an impulse control disorder and coined the term Internet

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Addiction Disorder. [5] Internet Addiction is defined as a loss of control of Internet use and excessive Internet use to the point where they experience problematic outcomes that negatively affect their life.[6]. Excessive smartphone use or Internet Addiction Disorder is not specifically diagnosed in either ICD-10[7] or DSM-IV[8]. It is a newer concept. Neither the International Classification of Diseases (ICD-11[9]) nor the Diagnostic and Statistical Manual of Mental Disorders (DSM-5)[10] explicitly recognizes "Internet Addiction Disorder," both systems acknowledge gaming disorder as a potentially addictive behavior, necessitating additional investigation. Diagnosing excessive internet use lacks consensus, with clinicians classifying it as impulse control disorder unspecified, other personality disorder, or factitious disorder imposed on self. This nosological ambiguity and lack of conceptual clarity lead researchers to question its validity. As internet use becomes ubiquitous, alleged 'symptoms' of addiction may reflect a normative shift in how young people socialize and have fun rather than a disorder. Sahel et al.[11] argue that researchers may pathologize what a new way of life is.

There is also a lack of empirical research explaining what leads to or follows excessive SNS use. The focus has always been on direct effects models exploring the association between psychological vulnerabilities and excessive SNS use[12]. A direct effects approach has not allowed researchers to explore the significant predictors of internet addiction while controlling for interactions with other influencing psychosocial conditions or mediating variables[12]. This author also calls for exploring motivations in conjunction with psychosocial well-being to know whether it elaborates on why someone gets dependent on SNS. Bessier et al. [13] stated that people who feel bad, use online entertainment as a self-medication. Caplan[14] suggested that through the exchange of online messages, users compensate for what they lack in real life. Speculations regarding considering excessive internet use as a coping strategy grounded in understandable (but not always healthy) motivations were repeatedly mentioned in many studies[15,16,17] but not empirically tested.

Recent studies[18] explore how the interaction between BIS and BAS scores illustrates a dual system model of internet addiction. Two general motivational systems[19] underlie all behavior, including addictions. The Behavioral Approach System (BAS) regulates appetitive motives, which drive individuals to move toward something desired. Conversely, the Behavioral Inhibition System (BIS) regulates aversive motives, prompting individuals to move away from something unpleasant.

The BIS/BAS Scale measures two motivational systems[19]:

1. Behavioural Inhibition System (BIS): This corresponds to motivation to avoid aversive outcomes. It regulates aversive motives, which aim to move away from something unpleasant.

2. Behavioural Activation System (BAS): This corresponds to motivation to approach goal-oriented outcomes. It is believed to regulate appetitive motives, which aim to move toward something desired.

Our study empirically investigates the pervasive assertion that heightened usage of SNS is indicative of addictive behavior. The study seeks to elucidate the disparities in psychological well-being between people with and without smartphone addiction, if any and whether psychological well being can predict smartphone addiction. It also seeks to discern the differential prevalence of anxiety and depression among individuals exhibiting

smartphone addiction from those who do not, if any. It also evaluates the role of anxiety and depression as potential predictive factors for smartphone addiction. The study also aimed to determine differences in BAS and BIS scale scores between individuals with and without smartphone addiction, and to assess if these scores could predict smartphone addiction.

MATERIALS AND METHODS

This was a survey-based study that utilized Google Forms to collect data through a predesigned questionnaire consisting of open-ended and closed-ended questions. The data collection period was five days, from August 29, 2023, to September 2, 2023. This duration was chosen based on Survey Monkey's 2022 analysis, which found that surveys collecting between 50 and 500 responses typically generate maximum responses when open for 3-7 days. Sample size was also determined based on this.

Working Definitions

- Netizens: Individuals who engaged in at least three daily interactions on two or more platform on social networking system .
- Smartphone Addiction: Internet addiction by means of smartphone use is considered as smartphone addiction and is used as a window to assess the gravity of SNS use in this study. Smartphone addiction is determined based on the Smartphone Addiction Scale.

Participants who voluntarily filled out the questionnaire after viewing it on their social networking feeds and provided informed consent on the first page of the questionnaire were included in the study. Participants who did not complete the informed consent form or gave incomplete data were excluded.

The questionnaire was shared through various SNS platforms such as WhatsApp status, Twitter, and Instagram status of the authors. Informed consent was obtained from all participants on the first page of the questionnaire. Participants filled out the questionnaire voluntarily without any compulsion or incentive. The study adhered to ethical guidelines to protect the privacy and confidentiality of the participants.

The tools used were

1. The Ryff's Scale of Psychological Well-being (18 items) [20]

Ryff's Scale of Psychological Wellbeing is a 6-point Likert scale that includes six distinct components of positive psychological functioning: Autonomy, Environmental mastery, Personal growth, Positive relations with others, Purpose in life, and Self-acceptance. Nine items are reverse scored, and the refined sum is taken as the total score. This scale has internal consistency (α) ranging from 0.93 to 0.86, and test-retest reliability over six weeks returned coefficients ranging from 0.88 to 0.81. This scale and sub-scale have significant convergent and discriminant validity.

2. Smartphone Addiction Scale (Shorter Version)[21]

Initially, the Smartphone Addiction Scale (SAS) consisted of 6 factors and 33 items with a six-point Likert scale based on self-reporting. The six factors were daily-life disturbance, positive anticipation, withdrawal, cyberspace-oriented relationship, overuse, and tolerance. The

internal consistency test result (Cronbach's alpha) was 0.967 during its development stages. Kwon et al. [22], who developed the shorter 10-item version, verified the internal consistency and concurrent validity (Cronbach's alpha correlation coefficient of 0.91).

3. Beck's Anxiety Inventory (BAI) [23]

This scale (21 items) is a self-report measure of anxiety. It has an internal consistency of 0.92 (Cronbach's α) and test-retest reliability (1 week) of 0.75, and moderately correlated with the revised Hamilton Anxiety Rating Scale (0.51).

4. The Beck Depression Inventory (BDI) [24]

This 21-item self-report inventory measures characteristic attitudes and symptoms of depression. The BDI is a reliable and valid measure of depression, with test-retest reliability coefficient α = 0.93 and internal consistency Cronbach's α=0.86

5. Behavioural Inhibition System / Behavioural Approach System (BIS/BAS) Scale[19]

It is a 24-item self-report questionnaire with three BAS-related scales and one BIS-related scale. Cronbach's α for BIS (7-items) is 0.78, and BAS (Reward responsiveness, Drive, and Fun seeking) are 0.844, 0.769, and 0.772 respectively.

Statistical Analysis

Categorical and continuous data were recorded using frequency tables and diagrammatic representations to provide insights into the data. Chi-square tests were utilized to examine associations among the two types of internet users—pathological (with smart phone addiction) and non-pathological (without smartphone addiction)—and variables such as anxiety and depression levels. Analysis of pathological internet users and netizens based on total scores and subscales of well-being scales was conducted using multivariate analyses of variance (MANOVA) and univariate analyses of variance (ANOVA). Logistic regression and ROC curves were also employed to determine the relationship between factors in the BIS BAS scale and pathological internet use, and to assess the predictability of pathological internet use based on specific variables in the study (BIS BAS scale, anxiety, and depression scores). The software used included R packages ggplot2 and plotrix for frequency tables and diagrammatic representations, R for chi-square tests, MANOVA, and ANOVA, and the pROC package in R for logistic regression and ROC curves.

RESULTS

The Google Form questionnaire had 2255 views, with 122 participants completing the survey. Most respondents (71%) were aged 20-29, while 12% were under 20 and 16% were over 29. The majority were female (72%), with males making up 26%. Two percent did not disclose their gender. Most participants (86%) were Indian nationals, while 14% were from various other countries (Britain, USA, France, Australia, Indonesia, Germany, Switzerland, Vietnam, and Singapore). Participants were from rural (50), urban (28), and semi-urban (44) backgrounds, including 76 students, 45 professionals, and one unemployed person. Twenty participants had a history of mental illness. All participants used at least one social networking site daily. Table 1 shows the usage distribution among different social networking platforms.

Table 1:
Social Networking Systems (SNS) Usage Distribution

SNS (Social Networking System)	Percentage
Whatsapp	40.4
Instagram	33.5
Facebook	13.6
Twitter	10.7
Kakaotalk	1.8

78.69% of people identified themselves as netizens according to the operational definition given in the questionnaire (Table 2). Of the total responses, 38.5% satisfied the criteria for smartphone addiction, while 61.5% had no smartphone addiction according to the Smartphone Addiction Scale (Table 2). Of those who identified themselves as netizens, 36.5% had smartphone addiction, while 12 people who didn't identify themselves as netizens had smartphone addiction.

Table 2:
Smartphone Addiction among Netizens and Non-Netizens

	Addiction Present	Addiction Absent	Total
Netizens	74.47%	81.33%	78.69%
Non Netizens	25.53%	18.67%	21.31%
Total	38.5%	61.5%	100%

The mean total score of the psychological well-being scale and all six subscales were higher in individuals without smartphone addiction. This difference is statistically significant in the subscales for Total Environmental Mastery, Personal Growth, and Self-Acceptance (Table 3). Logistic regression analysis (Table 4) identified the Personal Growth subscale as a significant predictor of smartphone addiction, with a coefficient of -0.22 (p=0.02). For every one-unit increase in the Personal Growth score, the log odds of having smartphone addiction decrease by 0.22. The Nagelkerke R^2 value of 0.113 suggests an 11.3% variation in smartphone addiction prediction by Personal Growth.

Table 3: Comparison of Mean Scores of Psychosocial Wellbeing Scale and Smartphone Addiction

Psychosocial Wellbeing (PSWB) Scale & Subscale Scores (SS)	Addiction Present		Addiction Absent		F Value	P Value
	Mean	SD	Mean	SD		
Refined Sum PSWB	108.43	8.22	111.85	10.77	3.48	0.06
Total Autonomy SS	13.81	3.59	14.53	2.80	1.55	0.22
Total Environmental Mastery SS	**13.74**	**3.02**	**15.09**	**2.96**	**5.91**	**0.02***
Personal Growth SS	**15.77**	**2.68**	**17.44**	**2.72**	**11.06**	**0.001****
Positive Relation With Others SS	14.06	3.78	15.15	3.80	2.35	0.12
Purpose In Life SS	13.51	3.32	14.71	3.56	3.44	0.07
Self-acceptance SS	**13.23**	**3.37**	**15.24**	**3.56**	**9.57**	**0.002****

*p < 0.05; ** p < 0.01

Table 4: Psychosocial Wellbeing Scale Scores as Predictors for Smartphone Addiction

	Odd Ratio, Exp(beta)	Estimate(beta)	P - Value
Refined Sum PSWB	1.07	0.07	0.11
Total Autonomy SS	1.00	0.0	0.90
Total Environmental Mastery SS	0.90	-0.11	0.20
Personal Growth SS	**0.80**	**-0.22**	**0.02***
Pro Ss	0.97	-0.03	0.69
Purpose In Life SS	0.89	-0.12	0.15
Self-acceptance SS	0.87	-0.14	0.06

Mean scores on the BIS, BAS Drive, and BAS Fun Seeking subscales were slightly higher for those with smartphone addiction, while BAS Reward Responsiveness scores were higher for those without. (Table 5) Logistic regression found BIS scores to be a significant predictor of smartphone addiction, with a coefficient of 0.13 (p=0.04). (Table 5) Each one-unit increase in BIS score raises the log odds of smartphone addiction by 0.13. BAS Reward Responsiveness had a coefficient of -0.20 (p=0.0726), indicating a decrease in log odds of addiction, though not statistically significant. BAS Drive and BAS Fun Seeking coefficients were 0.06, also not significant.

Table 5: Distribution of BIS/BAS score and Odds Ratios of BIS/BAS Scale Scores as Predictors in Logistic Regression for Smartphone Addiction

	Addiction Present		Addiction Absent		Odd Ratio Exp(beta)	Estimate (beta)	P-Value
	Mean	SD	Mean	SD			
BIS	21.49	3.05	20.4	3.32	1.14	0.13	**0.04***
BAS Reward Responsiveness	17.02	2.17	17.43	1.99	0.82	-0.20	0.07
BAS Drive	11.77	2.45	11.63	2.49	1.06	0.06	0.56
BAS Fun Seeking	12.28	1.96	12.25	2.20	1.06	0.06	0.63

Table 6 shows that 19% of participants with smartphone addiction had concerning anxiety levels, compared to 8% without addiction (p=0.13), indicating no significant association. Table 7 also reveals that 14.9% of those with smartphone addiction had moderate depression, and 34.04% had severe depression, compared to 9.33% and 14.6% without addiction, respectively (p=0.016). Thus, there is a significant association between depression levels and smartphone addiction.

Table 6: Percentage Distribution of Smartphone Addiction Based on Anxiety and Depression Levels

		Smartphone Addiction Present	Smartphone Addiction Absent	Total
Anxiety levels	0-21(Low Anxiety)	63.83%	78.67%	72.95%
	22-35(Moderate Anxiety)	17.02%	13.33%	14.75%
	36&above (Potentially Concerning Level Of Anxiety)	19.15%	8.00%	12.3%
Depression Levels	Normal (Depression)	40.42%	69.34%	58.2%
	Mild Depression	10.64%	6.67%	8.2%
	Moderate Depression	14.89%	9.33%	11.47%
	Severe Depression	34.04%	14.66%	22.13%

The logistic regression analysis (Table 7) shows an intercept of -1.02 for Beck's Anxiety Inventory (BAI) and Beck's Depression Inventory (BDI) scores, indicating the log-odds of being a pathological internet user when both scores are zero. The BAI coefficient is -0.01 (p=0.64), not statistically significant. The BDI coefficient is 0.06 (p=0.03), statistically significant; each one-unit increase in BDI raises the log odds of being a pathological internet user by 0.06. Thus, the total BDI score significantly predicts smartphone addiction.

Table 7: Odds Ratios and P-Values for Beck's Anxiety Inventory and Beck's Depression Inventory as Predictors of Smartphone Addiction.

	Odds Ratio	Estimate (Beta)	P-Value
Sum BAI	0.99	-0.01	0.64
Sum BDI	**1.06**	**0.06**	**0.03***

DISCUSSION

The advent of SNS has revolutionized how we communicate and interact with others beyond geographical boundaries. The relationship between SNS use and mental health is a complex and multifaceted issue that has garnered significant attention in recent years. There is a growing body of research suggesting that SNS use can have a profound impact on mental health, with studies indicating both positive[25] and negative effects[26, 27, 28].

In our study, 71% of the participants were between ages 20 and 29. This is more than the Digital 2023 July Global Statshot Report by DataReportal[29], in which only 31.8% of all social media users fell within the age group of 20 to 29. There was also participation from SNS users below 20 years and above 29 years. This distribution of ages provides a comprehensive insight into the age demographics of the study population. Our study, which includes social network users from around the world with diverse genders, highlights the global dimension of our research topic. The diversity of the participants, encompassing individuals from rural, urban, and semi-urban backgrounds and a mix of employed individuals, unemployed individuals, and students, enriches the breadth of perspectives and experiences represented in the study, potentially enhancing the generalizability of the findings. Pew Research Centre study, [30] University of Derby Study [31], and several other studies[32] suggest a correlation between Smartphone use and SNS use.

Our study has also considered Smartphone addiction as a window to assess the gravity of SNS use as an operational definition. While the majority of participants actively used two or more social networking platforms daily and were considered netizens or "addicted to SNS" by ordinary standards, only 36.5% exhibited signs of smartphone addiction according to the Smartphone Addiction Scale. Intriguingly, 12% of those not classified as netizens also scored positive on the scale. This highlights the importance of understanding excessive social network use in light of individual motivations and real-life contexts rather than simply attributing it to stereotypical addictive behaviours. This has been a missing component in most research because direct effects models are restrictive by nature and do not allow the researcher to consider the impact of other variables and, therefore, mask underlying processes that may be vital in experiencing excessive use[12].

Well-being is a multifaceted, dynamic concept.[20] It includes subjective, social, psychological, and health-related dimensions. Several studies have explored the impact of SNS use on psychosocial well-being. Some studies have provided evidence that SNS users are more mentally healthy because of the exchange of social support.[25] However, other studies have pointed to a decline in psychosocial well-being. [26, 27, 28] A meta-analysis, mostly among students, found the mean correlation between time spent on social networking system and psychological well-being was low (r = -0.07). Further, the correlations between time spent on social networking system and positive indicators (self-esteem and life satisfaction) were close

to zero. Whereas the correlation between time spent on social networking system and negative indicators (depression and loneliness) was weak.[33] Our study found small but statistically significant differences in psychosocial well-being between those with and without smartphone addiction, particularly in environmental mastery, personal growth, and self-acceptance. Those without addiction scored higher in these areas. High environmental mastery scores reflect effective life management; high personal growth scores indicate ongoing self-improvement, and high self-acceptance scores show positive self-perception. This suggests that excessive SNS use may be a coping strategy for individuals with lower life skills in these domains.

The finding from binary regression analysis in a study by Kwak M J & Kim D J[34] showed that reward responsiveness from the Behavioral Activation System (BAS), a lack of self-control, and anxiety significantly increased the odds of problematic smartphone use of smartphone-based SNS users. Reward responsiveness was found to be the most powerful predictor. Our study found that for every one-unit increase in BIS score, the log odds of being a pathological internet user (as opposed to a non-pathological internet user) increase by 0.13, assuming all other variables were constant. If a person has a high motivation to avoid aversive outcomes (BIS Motivation), there is more chance for using SNS as a means to avoid difficult situations and to become a pathologic internet user. For example, consider a student with an unmet real-life need to score high marks in a background of poor academic training. If his tendency to go online is boosted by a motivation to avoid unpleasant real-life situations (High BIS Score), and difficulty in conscious recognition of their own self-improvement (low score on personal growth subscale of PSWB), there is a high chance of going in for pathological internet use. This could result in increased screen time and further decline in academic performance.

It is necessary to distinguish between the use, overuse, and misuse of the Internet and SNS in clinical scenarios. The relationship between SNS use and mental health is influenced by many factors, including the ways in which individuals use these platforms and their pre-existing mental health conditions[27]. A study by Kaess et al. [35] points out that pathological internet use should rather be considered as psychopathology. Excessive internet use, on the other hand, should be classified as adolescent risk behaviour. As such, it is a topic that warrants further exploration and understanding. Twenty participants of this study had a history of mental illness. Some studies suggest that frequent use of SNS can lead to increased social comparison, which in turn lowers self-esteem and depression[36,37]. High engagement with SNS has been linked to FOMO (Fear of Missing Out), the pervasive that others might be having rewarding experiences from which one is absent[38]. This can lead to a perpetual state of anxiety and constant checking of SNS platforms[39]. In a study conducted by Islam MR et al. [40] in Bangladesh involving 791 SNS users, 38% were found to be dealing with depression, while 63% were experiencing anxiety. A recent metanalytic review[28] of 37 studies (N= 84955) found that SNS use is associated with not only the likelihood of experiencing overall mental illness (r =0.11) but also specific illness, including depression (r =0.10), suicidal ideation (r = 0.22).

Our study found that 36% of individuals with smartphone addiction and 21% without it had

moderate/severe anxiety. Depression symptoms affected 60% of those with addiction and 31% without. This highlights the widespread nature of depression, regardless of technology use. The study shows a significant link between depression and smartphone addiction, with each one-unit increase in Beck's Depression Inventory score raising the log odds of pathological internet use by 0.06 (p=0.03). Depression can both result from and predict excessive smartphone use, indicating a two-way relationship. On one hand, excessive smartphone use can lead to depression due to factors such as lack of physical activity, decreased social interaction, relationship issues, disrupted sleep patterns and other stressors of digital world. On the other hand, individuals already experiencing depression may use their smartphones excessively as a form of escapism or to avoid negative feelings. Addressing mental health, especially depression, is crucial for managing smartphone addiction, emphasizing the need for a holistic approach to mental health in the digital age.

CONCLUSION

This study suggests that merely being active on SNS does not necessarily lead to a diagnosis of smartphone addiction. Rather than the dominant theory of smartphone addiction as a compulsive behavior and a mental disorder, we need to understand it based on context, purpose, and motivation. An individual struggling with psychosocial well-being, leading to low self-acceptance, lack of control over their environment, and inadequate coping skills for personal growth, are likely to use social networking systems as a refuge (as indicated by their BIS Score). They may rely on these platforms to fulfill their unmet needs. Mental illness like depression also needs to be ruled out while exploring behaviors pointing to smartphone addiction.

This study faces several limitations, including self-selection bias, where respondents using SNS and with specific biases may opt into the sample, potentially skewing the results and making them less representative of the overall population. Additionally, response bias is a concern, as participants may answer questions in ways that do not accurately reflect their true feelings or behaviors. Measurement bias is another concern due to variations in the operational definitions used in this study compared to those in other studies. The study population comprised of 20 participants with mental illness which might have confounded the high value of BDI and its association with smartphone addiction. Furthermore, this study does not examine other variables, such as personality traits, which may also influence SNS use.

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