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Psychosomatic symptoms and attainment of flow state among adolescents: Role of social networking usage

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ABSTRACT. Lo scopo di questo studio è stato quello di esplorare il ruolo dell'uso dei social media nei sintomi psicosomatici e nello stato di flow degli adolescenti. I dati sono stati raccolti su 200 partecipanti (94 maschi e 106 femmine) con un'età compresa tra 16 e 19 anni (età media 18,58) provenienti da Haryana e Delhi-NCR, regione dell'India. Per raccogliere i dati sono stati utilizzati il *Patient Health Questionnaire (PHQ-15)*, il *Flow State Questionnaire* e il *Social Networking Usage Questionnaire*. I risultati hanno indicato una significativa correlazione positiva dell'uso dei social media con i sintomi psicosomatici e una correlazione negativa con lo stato di flow degli adolescenti. L'analisi di regressione graduale ha rivelato che l'uso dei social network (socializzazione, informazione e intrattenimento) ha contribuito in modo significativo ai sintomi psicosomatici degli adolescenti.

SUMMARY. The aim of this study was to explore the role of social media usage in the 'psychosomatic' symptoms and flow state of adolescents. The data was collected from 200 participants (94 males and 106 female) with the age range of 16 to 19 years (mean age 18,58) from Haryana and Delhi-NCR region of India. The sample was selected using convenient sampling method. Measures of Patient Health Questionnaire (PHQ-15), Flow State Questionnaire and Social Networking Usage Questionnaire were used to collect the data. Findings indicated a significant positive correlation of social media usage with the psychosomatic symptoms and negative correlation with the flow state of the adolescents. Stepwise regression analysis revealed that social networking usage (socialization, informativeness & entertainment) contributed significantly to the psychosomatic symptoms of adolescents. In addition, social networking usage and their dimensions negatively predicted the flow state of adolescents. Health care professionals and government may use the findings of the study to regulate the use of social media especially for adolescents to alleviate the ill effects of social networking usage and promote health related behavior among adolescents

Keywords: *Psychosomatic symptoms, Flow state, Social networking usage, Socialization, Informativeness*

INTRODUCTION

Social media usage among children and adolescents has become a form of mental and behavioral addiction characterized by a strong and continuous desire to remain online and often ignoring other aspects of one's own life (Brailovskaia, Schillack & Margraf, 2020). People hooked to these platforms, when are unable to access social networking sites (SNSs) frequently, they go through unpleasant psychological states like mood swings, unhappiness, restlessness, and worry (Brailovskaia & Teichert, 2020; Kumar & Prabha, 2019; Sabir, Nasim, Majid & Sabir, 2020). Physical and psychological problems, such as feelings of inadequacy or superiority, can also be caused by this addiction (Sabir et al., 2020). While several other studies have emphasized the benefits of using SNS, including how it may help with communication, self-promotion, entertainment, and a sense of belonging (Appel, Marker & Gnambs, 2020; Brailovskaia, Rohmann, Bierhoff & Margraf, 2018; Brailovskaia & Teichert, 2020). According to recent data, 5-10 per cent of Americans (Hilliard, 2022) and over 210 million people globally (Maya, 2022) fulfil the criteria for social media addiction. The use of SNSs has turned into an addictive habit for certain age group.

The use of social media has intruded into almost every aspect of daily life and affects all age groups, with adolescents and children being the most vulnerable populations. Studies show that social media use is associated with severe mental health issues (Przybylski, Orben & Weinstein, 2020), and in adolescents and children, higher levels of social media use have been linked to increased problems with internalizing and externalizing difficulties (Riehm, Feder & Tormohlen, 2019). Excessive social media use has also been associated with body image issues, problematic eating, and is considered a risk factor for behaviors such as alcohol consumption, with the consequences being particularly high among young adults (Holland & Tiggemann, 2016; Moreno, D'Angelo & Whitehill, 2016).

Recent studies have indicated that social media use for more than two hours per day is associated with serious consequences for social and emotional well-being, inflated self-esteem, and heightened vulnerability to harassment (Bozzola et al., 2022; Senekal, Groenewald, Wolfaardt, Jansen & Williams, 2023). Nowadays, adolescents and children report feeling pressured to upload, share their activities, stay connected, and reply quickly to messages, which creates a barrier to reducing or stopping social media use (Shankleman et al., 2021). The issue of excessive time spent on social media has also been linked to poor sleep quality, poor body image, increased emotional issues, and other mental health problems, including suicidal ideation (Memon, Sharma, Mohite & Jain, 2018; Vidal, Lhaksampa, Miller& Platt, 2020; Webster, Dunne & Hunter, 2021). Studies have also reported that excessive social media use by adolescents makes them more prone to deliberate self-harm, which is associated with the normalization of excessive social media use (Moss, Wibberley & Witham, 2023).

Literature reports that social networking has two aspects. One aspect involves people's interaction with one another, they can express themselves, exchange intriguing content. As a result, a completely new cultural paradigm that alters social interaction and has an impact on business and technology has been created. The other aspect includes forced isolation, elevated anxiety, and stress, particularly among kids and teenagers, which leads to change in habits. Young adolescents find it extremely difficult to envision life without Facebook, Instagram, and all of their predecessors. Studies also conclude that social media can have both positive and negative effects (Simms, 2022).

One of the primary drawbacks of social media has been its potential to foster addiction. The act of constantly checking various social networking sites could develop into compulsive behavior. According to researchers, the gratification experienced from receiving 'likes' and 'shares' stimulates the brain's reward center, especially among adolescents. These characteristics also had an impact on emotional states (Abraham, 2022). As a result of constant social media sharing of information and selfies, the obsession with themselves grows. They assessed their confidence by counting the number of 'likes' their social media posts received, and if they didn't get the expected response, they could start feeling uneasy. As a result, some kids and teenagers could believe that they were the center of the universe.

In addition, social interaction plays a vital role in the development of cognitive skills necessary to understand the emotions and perspectives of others. As children grow older, it is crucial for them to learn how to interpret facial expressions and non-verbal cues. Relationships conducted through screens have the potential to undermine real-life connections and social skills in children and teenagers. Individuals addicted to social media may exhibit lack of empathy and struggle with both verbal and non-verbal communication abilities. During times of extreme isolation caused by the pandemic, YouTube,

TikTok, Snapchat etc. provided essential avenues for social interaction, which was a regular part of personal development. However, they were also linked to mental health problems such as anxiety, depressive symptoms, and body image issues (Abraham, 2022).

Evidences indicate that the majority of mental health issues affect somatic functions. Psychosomatic disorders are mental illnesses that manifest as physical symptoms but frequently have unknown medical etiology. It might be challenging for those who have this illness to carry out daily activities because they may worry excessively about their symptoms or have excessive thoughts or sentiments about them. Every physical ailment has a mental component (Kurlansik & Maffei, 2016). Individual differences in how we respond to and manage the disease are significant. It is believed that some physical conditions are more vulnerable to being exacerbated by mental conditions like stress and worry. The severity of a physical illness could fluctuate depending on the emotional condition (Satsangi & Brugnoli, 2017).

A cross-sectional study on internet use and psychosomatic symptoms among university students was carried out by Stiglic and colleagues (Stiglic, Masterson Creber & Cilar Budler, 2022) which investigated the connection between internet use, psychological health, and psychosomatic symptoms among Slovenian university students. The findings indicated that computer science students reported less physical complaints and higher psychological problems than health science students. Kumar and Prabha (2019) carried out a study to examine the association between internet addiction and psychosomatic symptoms, and reported that internet addiction tendency was associated with many psychosomatic symptoms among students.

Schuur, Baumgartner and Sumter (2018) investigated the cross-sectional and longitudinal connections between adolescent social media use, social media stress, and sleep. The results revealed that social media stress was only associated with girls' eventual sleep delay and daytime drowsiness. The results highlighted the need to pay attention to adolescents' perceptions and coping mechanisms for their use of social media rather than just the frequency of usage.

Flow refers to the ideal state of human experience when a person is fully engaged in an activity that provides a balance between challenging tasks and one's skills. Csikszentmihalyi and others, emphasized the importance of clear goals and immediate feedback during the activity (Csikszentmihalyi, 1988; Csikszentmihalyi, 1990; Csikszentmihalyi, 1997). People get completely absorbed in their jobs demanding undivided attention so that they lose track of the concerns and disappointments of daily life. When people engage in their jobs, the feeling of self-fades away, but conversely, after the task is finished, the sense of self becomes stronger. The act of doing something is fundamentally and instantly fulfilling. Flow experiences affect how one perceives time. Hours can seem to pass in a matter of minutes. Autotelic activities result in flow experiences.

The occurrence of flow experiences is influenced by cultural and familial factors. Some cultures and family structures provide more conducive environments for flow experiences to occur. Certain families offer socialization opportunities that help children to develop personality traits and facilitate the experience of flow (Csikszentmihalyi & Csikszentmihalyi, 1992). Additionally, individuals enhance the frequency of flow experiences by seeking out work positions that present challenges which push their skills to the limits.

Engaging in activities such as dance, music, rhythmic exercise, or meditation, and incorporating them into regular practice enhances flow experiences based on rituals. Furthermore, by embracing a lifelong learning mindset, maintaining an open mind, and actively striving to improve the ability to achieve flow, individuals can increase the frequency of flow experiences related to intellectual pursuits. The self-determination theory of motivation offers a better explanation for motivation, which plays a positive role in the flow state (Deci & Ryan, 1980).

The self-determination theory asserts that for individuals to experience psychological growth, they must experience three key elements: autonomy, competence, and connection or relatedness. Autonomy refers to individuals feeling in control of their actions and goals. A sense of self-determination is greatly facilitated when individuals believe they have the ability to take immediate action that will result in meaningful change. Competence involves learning new skills and achieving mastery in tasks. When individuals perceive themselves as having the necessary abilities for success, they are more likely to take actions that align with their goals. Connection or relatedness refers to the need for individuals to feel a sense of attachment and belonging to others. Engaging in activities that promote cognitive, social, and emotional development during crucial periods plays a vital role in an individual's overall development and functioning (Deci & Ryan, 1980).

When in a state of flow, people reach a higher degree of concentration where their focus is entirely on the work at hand and there is no place for interruptions. The ego may momentarily dissolve as a result of their altered perception of time, impaired self-awareness, and other symptoms. Yao, Xie and Chen (2022) investigated how active social media use affected feeling of flow and how academic self-efficacy acted as a mediator. The study found that active social media use significantly and favorably affected the sense of being in the flow. Additionally, frequent usage of social media significantly and favorably affected academic self-efficacy. Zhao and Zhou (2021) looked at the mediating roles of active use and social media flow in order to understand the relationship between COVID-19 stress and addictive social media use. The findings indicated a positive correlation with COVID-19 stress and propensities for addictive social media use. The results implied that people who experienced higher levels of COVID-19 stress were more likely to develop addicted social media use, which might be aided by active use and flow experiences.

Lin and colleagues (Lin, Lin, Turel & Xu, 2020) studied the association between overload, the intention to stop using social media and the buffering effect of flow experience. The stimulus-organism-response (S-O-R) framework and flow theory were combined. The findings were consistent with the S-O-R paradigm and showed that social, informational, and communicational overload (stimuli) increased users' feelings of weariness (organism), which in turn increased users' intents to stop using social media (response).

Another study (Lin, Lin, Luo & Liu, 2021) investigated how social media users altered their discontinuous usage intention, particularly in various psychological states (such as weariness and flow experience), when they meet overload and participated in adaptive and maladaptive coping measures. According to the findings, users' adaptive coping was started by information, communication, and social overload while maladaptive coping was only sparked by communication overload. Pelet, Ettis and Cowart (2017) conducted a study on the best flow experience enhanced by telepresence and social media usage evidence. The results found that the five aspects of flow - enjoyment, concentration, challenge, control, and curiosity - are favorably impacted by telepresence.

Similarly, Mauri and colleagues (Mauri, Cipresso, Balgera, Villamira & Riva, 2011) carried research on 'Why Facebook is so successful?'. A core flow state was described by psychophysiological measurements while using Facebook. The purpose was to understand whether using SNSs caused a particular psychophysiological pattern. According to statistical analysis of the psychophysiological data and pupil dilation, on numerous linear and spectrum indicators of somatic activity, the Facebook experience was considerably different from stress and relaxation.

After conducting an analysis of relevant available studies, it was felt crucial to empirically investigate social media usage, the state of flow, and psychosomatic symptoms among adolescent population. The use of social media among adolescents has increased significantly due to societal advancements, widespread internet access, and the prevalence of smartphones. In India, children begin engaging with social media around the ages of nine and ten, primarily due to easy availability of smartphones, internet access, and the working conditions of parents. The excessive use of social media has various adverse effects on adolescent development, leading to both physical and mental health issues. Following the global COVID-19 pandemic, the screen time of adolescents and other demographics has increased substantially, manifesting in psychosomatic symptoms among adolescents. Research investigating the relationship between social media usage and psychosomatic symptoms has yielded mixed findings, with some studies highlighting the positive impacts of social media while others suggested a negative influence on adolescent development. Furthermore, the use of social media also influences the attainment of the state of flow, particularly among student populations. Nevertheless, the existing literature lack consistency in terms of the positive and negative effects of social media usage on the state of flow in adolescents.

Limited research exists on the relationship between social media use, the state of flow, and psychosomatic symptoms. Additionally, there are contradictory findings regarding the positive impact of flow on academic achievement (Mustafa & Jahan, 2019). Recent researches suggest that the human brain is susceptible to the effects of social media use, and attaining a state of flow requires artificial changes in the brain. The question arises that how do these artificial changes affect individuals and potentially contribute to somatic symptoms? Previous studies have not thoroughly explored the gender differences in these factors, and the samples used in earlier research were limited in their generalizability. The results of studies investigating gender differences in social media use, psychosomatic symptoms, and flow have been inconsistent and contradictory. Stiglic and colleagues' (2022)

study revealed the impact of unequal gender distribution on research outcomes, emphasizing the need for a broader study population. Furthermore, previous studies failed to consider the contribution of flow state to the psychosomatic symptoms experienced by adolescents.

Therefore, the present study aims to explore how social media use affects an individual's functioning and the attainment of the flow state, investigates instances where the flow state may be directed inappropriately or in the wrong direction. By examining these aspects, following objectives and hypotheses have been formulated for the present study.

Objectives

- To assess and compare the flow state, social media use and psychosomatic symptoms among male and female adolescents residing in different rural and urban areas.
- To explore the relationship of social media with the flow state of adolescents.
- To examine the relationship of social media, use with the psychosomatic symptoms of adolescents.

Hypotheses

- There would be no significant difference between male and female on flow state, social media use and psychosomatic symptoms.
- There would be no significant difference between the adolescents of rural and urban areas on flow state, social media use and psychosomatic symptoms.
- Social Media use would be negatively associated with the flow state of adolescents.
- Social media use would be positively associated with the psychosomatic symptoms of adolescents.

METHOD

Participants and procedure

The study was carried out on a sample of 200 adolescents (94 males and 106 female) aged between 16 to 19 years who were attending schools/colleges and hailed from varying socio-economic backgrounds (see Table 1). The participants were selected from northern region states of India. Written permission was obtained from the relevant authorities, principals, and Heads of Departments for conducting the study. The sample was drawn using convenient sampling method, involving personal visits to schools and colleges including public and private institutes of states of northern region of India. Students were approached during their free intervals at their campus so as to not disturb their classes. Since smartphones were prohibited on some school/college campuses, such participants were contacted at their hostels when they had access to their smartphones. The nature and purpose of the study was clearly stated and procedures was well explained to each participant. Informed consent was obtained from the participants. In case of minor participants (below 18 years) assent was sought from participants and consent was taken from the legal guardians of the participants. The correlational design was employed to investigate the relationship of social media usage with the psychosomatic symptoms and flow state experienced of the adolescents. The study was approved by the Department of Psychology, Central University of Haryana. The ethical guidelines of American Psychological Association (APA) were followed during the entire process of study, right from data collection to writing of the manuscript.

Priori analysis

The *a priori* correlation of the bivariate normal model was analyzed for correlation and mean differences between two independent groups using a *t*-test (see Table 2). G*Power software version 3.1 was used to determine the required sample size for the study. A medium effect size ($\rho = .30$, $d = .50$) was calculated for both one-tailed and two-tailed tests. The power analysis output indicated that 115 participants would be required for a one-tailed correlation analysis and 138 participants for a two-tailed correlation analysis. For the *t*-test, 176 participants (88 per group) would be required for a one-tailed test, and 210 participants (105 per group) for a two-tailed test.

Measures

- *Flow State Questionnaire*: The Flow State Scale used in the study was developed by Magyaródi, Nagy, Soltész, Mózes

Table 1 – Demographic characteristics of the participants included in the study

Demographic variables	Category	Percentage
Gender	Male	47
	Female	53
Domicile	Urban	44.5
	Rural	55.5
Age	16	2
	17	26.5
	18	33
	19	19.50
SES	Low SES	10.5
	Middle SES	86.5
	High SES	3
Education	9^{th} to 12^{th}	47.5
	Undergraduate	52.5
Parents education	Illiterate	46
	10^{th} to graduation	36.5
	Post graduate and above	17.5
Father employment	Unemployed	28
	Employed	72
Mother employment	Unemployed	74.5
	Employed	25.5

Legenda. SES = Socio-economic status.

Table 2 – Required sample for the study

Effect size	Required sample for one tail	Required sample for two tail
Medium (ρ = .30)	115	138
Medium (*d* = .50)	176	210

and Oláh, 2013. It consists of 20 items rated on a 5-point Likert scale. The scale includes 11 items that measure the subscale 'Balance between challenges and skill' and 9 items that measure the subscale 'Absorption in the task'. Examples of items include 'I was able to keep up with the challenges' for the balance between challenges and skills subscale and 'The activity totally engrossed my attention' for the absorption in the task subscale. The scale demonstrated acceptable reliability for both factors, with a Cronbach's alpha coefficient of .921 for the balance between challenges and skills subscale and .907 for the absorption in the task subscale. The inter-correlation between the two factors was found to be low but significant, with a correlation coefficient of .221 (p<.01).

– *Patient Health Questionnairre-15*: The PHQ-15 is a subscale of the Patient Health Questionnaire, specifically designed to evaluate somatic symptoms. It originated from the self-administered version of the Primary Care Evaluation of Mental Disorders (PRIME-MD) diagnostic tool, which was developed in the 1990s. The PRIME-MD questionnaire was created with the objective of efficiently diagnosing five prevalent mental disorders in medical settings: depression, anxiety, somatoform disorders, alcohol-related disorders, and eating disorders. In 2013, Kocalevent, Hinz, and Brahler standardized the PHQ-15 for use in the general population, enabling its widespread application and interpretation. The PHQ-15 was used to evaluate physical symptoms, with the exception of two items that were specific to adults. Participants themselves assessed the presence of symptoms they experienced over the past two weeks. Severity was rated on a 3-point scale, ranging from 0 (not bothered at all) to 2 (bothered a lot). The overall PHQ-15 score ranged from 0 to 30, with scores of ≥5, ≥10, and ≥15 indicating mild, moderate, and severe levels of somatization, respectively. The PHQ-15 demonstrates high reliability and validity in clinical and occupational healthcare settings. The scale exhibits strong internal consistency and convergent validity, with a construct validity of .75 and an internal consistency (Cronbach's α) value of α = .82.
– S*ocial Networking Usage Questionnaire*: Gupta and Bashir (2018) developed a questionnaire called the Social Networking Usage Questionnaire. It consists of 19 items and uses a five-point Likert scale. The scale aims to measure four factors: academic socialization, entertainment, informativeness, and social networking use specifically within the Indian population. The internal consistency of the scale was found to be high, with a Cronbach's alpha value of .83. Additionally, the scale demonstrated good convergent validity, ranging from .59 to .89.

RESULTS

The present study aimed to assess and compare social media use, flow state and psychosomatic symptoms between male and female adolescents and between rural and urban participants. In addition, the study also aimed to explore the relationship among these variable. To materialize this aim, the findings of the study are therefore discussed in three parts. First, a comparison of social media use, flow state and psychosomatic symptoms of male and female adolescents is presented. Secondly, a comparison of urban and rural participants on these variables is discussed. Lastly, the relationship among social media use, flow state and psychosomatic symptoms is investigated. All the assumptions related to applied statistics in the study have been thoroughly checked before applying in the study.

An independent-samples *t*-test was conducted to compare social media use, flow state, and psychosomatic symptoms between male and female participants residing in urban and rural areas. Assumptions for applying the statistical tests were checked, and details are provided in Table 3 and Table 4.

The dimensions of social networking usage included socialization, academic activity, informativeness, and entertainment, while dimension of flow state included balance of challenges and skills, absorption in the task. PHQ scores represented psychosomatic symptoms. To compare male and female adolescents on these variable, t-tests were applied. Pearson product-moment correlation and regression analysis were also performed to explore associations between relevant variables and determine the contributions of predictor variables to the criterion variable.

Latent profile analysis (LPA) was applied to identify distinct subgroups among participants who share similar patterns of social media use. The aim was to explore potential group differences in flow state and psychosomatic symptoms across profiles. LPA was also used to identify any heterogeneity and nuanced correlations within the data. A Gaussian mixture model, implemented using Python coding, was applied to detect similar patterns within the subgroups. Varying numbers of profiles (1 to 10) were tested

Table 3 – Score of skewness and kurtosis on study variables

Variables	Skewness	Kurtosis
Socialization	−.046	−.354
Informativeness	.106	−.226
Entertainment	.337	−.788
Balance of challenges and skills	−.221	.187
Absorption in the task	.449	1.571
Academic activity	.292	.110
PHQ	.022	−.627

Table 4 – Score of Kolmogorov-Smirnov and Shapiro-Wilk test on study variables

Variables	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	*df*	Sig.	Statistic	*df*	Sig.
Socialization	.082	200	.002	.986	200	.043
Academic activity	.074	200	.009	.987	200	.057
Informativeness	.090	200	<.001	.980	200	.006
Entertainment	.105	200	<.001	.954	200	<.001
Balance of challenges and skills	.073	200	.011	.990	200	.189
Absorption in the task	.104	200	<.001	.967	200	<.001
PHQ	.086	200	.001	.976	200	.002

Legenda. df = degree of freedom.

in the Gaussian mixture model, and for each model, the Bayesian information criterion (BIC) score was calculated to identify the optimal number of profiles by balancing model's complexity and fit.

Table 5 presents the means, standard deviations, and *t*-scores for male and female adolescents. Additionally, Table 6 displays the means, standard deviations, and *t*-scores for rural and urban adolescents. The correlation analysis results for the study variables are presented in Table 7. Further analysis is presented in Tables 8 and 9, which includes the results of multiple stepwise regression analysis using social networking usage as the predictor variable and flow state as well as psychosomatic symptoms as the criterion variables.

The results presented in Table 5 indicate that a significant difference was observed in academic activity between male and female adolescents (t = 3.744, df = 198, p<.01). Female participants scored significantly higher on academic activity (M = 7.51) compared to male participants (M = 5.63). Regarding socialization, informativeness, and entertainment in social media usage, as well as absorption in the task of flow state, female participants scored slightly higher than male participants. However, these differences were not found to be statistically significant. Similarly, for the balance of challenge and skills and the Patient Health Questionnaire (PhQ), male participants scored higher than female participants, but these differences were not statistically significant.

Table 5 – Mean, SD and *t*-score on social media use, flow state and psychosomatic symptoms of male and female adolescents

Variables	Gender	*Mean*	*SD*	*N*	*t*-score
1. Social networking usage					
a) Socialization	Male Female	14.67 15.06	3.94 4.20	94 106	−.684
b) Academic activity	Male Female	5.63 7.51	3.76 3.34	94 106	3.74**
c) Informativeness	Male Female	8.63 8.91	2.46 2.68	94 106	−.757
d) Entertainment	Male Female	10.36 11.49	3.74 16.78	94 106	−.638
2. Flow state					
a) Balance of challenges and skills	Male Female	10.02 9.45	3.73 4.395	94 106	.816
b) Absorption in the task	Male Female	8.40 8.77	2.53 2.68	94 106	−.996
3. Psychosomatic symptoms					
a) PhQ-Tot	Male Female	19.74 18.59	5.27 5.82	94 106	1.456

Legenda. PhQ = Patient Health Questionnaire.
**p<.01

According to Table 6, significant differences were observed between adolescents residing in urban and rural areas on the measures of socialization and informativeness of social networking usage (t = 3.65, df = 198, p<.01; t = 3.72, df = 198, p<.01). Urban participants scored higher than rural participants on these measures. However, no significant difference was found between urban and rural participants on the measures of academic activity and entertainment in social networking usage. In terms of the absorption in the task of flow state measure and the Patient Health Questionnaire, adolescents residing in urban areas scored higher than those in rural areas, and these differences were found to be statistically significant (t = 3.96, df = 198, p<.01; t = 3.37, df = 198, p<.01). Urban participants also performed better on the balance of challenge and skills measure, but this difference was not statistically significant.

Correlational analysis

Pearson product-moment correlation analysis was applied to examine the relationships between socialization, academic activity, informativeness, and entertainment measures of social networking usage with the balance of challenges and skills, absorption in the task of flow state, and psychosomatic symptoms (PhQ) measures. Given that

Table 6 – Mean, SD, and *t*-score on social media use, flow state and psychosomatic symptoms of rural and urban adolescents

Variables	Gender	*Mean*	*SD*	*N*	*t*-score
1. Social networking usage					
a) Socialization	Urban	16.02	4.16	89	3.65**
	Rural	13.96	3.80	111	
b) Academic activity	Urban	7.00	3.76	89	1.66
	Rural	6.34	3.56	111	
c) Informativeness	Urban	9.52	2.65	89	3.72**
	Rural	8.18	2.36	111	
d) Entertainment	Urban	12.43	18.10	89	1.50
	Rural	9.77	4.00	111	
2. Flow state					
a) Balance of challenges and skills	Urban	10.37	10.37	89	1.86
	Rural	9.28	9.29	111	
b) Absorption in the task	Urban	9.34	2.66	89	3.96**
	Rural	8.00	2.42	111	
3. Psychosomatic symptoms					
a) PhQ-Tot	Urban	20.58	5.78	89	3.37**
	Rural	17.97	5.17	111	

Legenda. PhQ = Patient Health Questionnaire.
**p<.01

the descriptive tables showed significant differences only between male and female participants on academic activity, while other variables did not exhibit significant differences, correlation analysis was applied on both groups together to explore the relationship of social networking usage and flow state with the psychosomatic symptoms of rural and urban adolescents.

The results indicated in Table 7 indicates that socialization was found to have a positive correlation with psychosomatic symptoms (r = .501, p<.01) and a negative correlation with the balance of challenges and skills (r = −.381, p<.01) and absorption in the task (r = −511, p<.01) of the flow state measure. Academic activity showed positive correlations with psychosomatic symptoms and both dimensions of the flow state measure, but these coefficients were not statistically significant. Informativeness, as a dimension of social networking usage, exhibited positive correlations with psychosomatic symptoms (r = .586, p<.01) and negative correlations with the balance of challenges and skills (r = −.322, p<.01) and absorption in the task (r = −.806, p<.01) of the flow state measure. Entertainment demonstrated a positive correlation with psychosomatic symptoms (r = .138, p<.05) and a negative correlation with the balance of challenges and skills (r = −.317, p<.01). The relationship between entertainment and absorption in the task of the flow state measure was not found to be statistically significant.

Regression analysis

Multiple stepwise regression analysis was applied to know the contribution of predictor variables in the criterion variables. All the dimensions of social networking usage measure were entered in the regression model with one criterion variable in the dependent column.

Table 8 displays the findings of a multiple stepwise regression analysis examining the relationship between social networking usage and psychosomatic symptoms. The results indicate that the combined factors of informativeness and socialization accounted for around 40 per cent of the variability in psychosomatic symptom scores. Specifically, informativeness alone contributed to 34.3 percent of the variance in psychosomatic symptom scores (F = 103.57, p<.01), while socialization accounted for 5.8 percent of the variance (F = 18.95, p<.01). Both informativeness and socialization of the social networking usage measure were identified as positive predictors of psychosomatic symptoms in adolescents. This implies that higher levels of informativeness and socialization were associated with increased psychosomatic symptoms (β = .448, β = .277).

Table 9 presents the results of multiple stepwise regression analysis for the relationship between social networking usage and the balance of challenges and skills measure of the flow

Table 7 – Correlations of social media usage (dimensions), with flow-state (dimensions) and the psychosomatic symptoms of adolescents

Variables	Patient health (Psychosomatic symptoms)	Balance of challenges and skills	Absorption in the task
Socialization	.501**	−.381**	−.511**
Academic activity	.039	.052	.001
Informativeness	.586**	−.322**	−.806**
Entertainment	.138*	−.317**	−.019

**p<.01, *p<.05

Table 8 – Stepwise regression analysis of social networking usage measure (dimensions) as predictor variables and psychosomatic symptoms (PhQ) as criterion variable

Predictors	*R*	R^2	Adjusted R^2	R^2 change	*Beta*	*F*	*F*-change	*t*-score
Informativeness	.586	.343	.340	.343	.448	103.57**	103.57**	7.03**
Socialization	.633	.401	.395	.058	.277	65.96**	18.95**	4.35**

**p<.01

Table 9 – Stepwise regression analysis of social media usage (dimensions) as predictor variables and balance of challenge and skills (flow state) as criterion variable

Predictors	*R*	R^2	Adjusted R^2	R^2 change	*Beta*	*F*	*F*-change	*t*-score
Socialization	.381	.145	.141	.145	−.270	33.67**	33.67**	3.75**
Entertainment	.472	.223	.215	.078	−.275	28.25**	19.66**	4.40**
Informativeness	.493	243	.232	.020	−.165	21.08**	5.28**	2.29**

**p<.01

state. The results indicate that informativeness, socialization, and entertainment together accounted for approximately 24.3 per cent of the variance in the scores of the balance of challenges and skills measure. Among these variables, socialization contributed 14.5 per cent of the variance in the scores of the balance of challenges and skills (F = 33.67, p<.01), entertainment accounted for 7.8 per cent of the variance (F = 28.25, p<.01), and informativeness accounted for 2 per cent of the variance (F = 21.08, p<.01) in the scores of the balance of challenges and skills measure. Interestingly, socialization, entertainment, and informativeness negatively predicted the balance of challenges and skills (flow state) in adolescents. This means that higher levels of socialization, entertainment, and informativeness of social networking usage were associated with a decrease in the quality of the balance of challenges and skills (flow state) in both urban and rural adolescents (β = −.270, −.275, −.165).

Table 10 presents the results of multiple stepwise regression analysis for the relationship between social networking usage and the absorption in the task measure of the flow state. The results indicate that informativeness and entertainment together accounted for approximately 65.70 per cent of the variance in the scores of the absorption in the task measure. Among these variables, informativeness contributed 65 per cent of the variance in the scores of the absorption in the task measure (F = 367.12, p<.01), while entertainment accounted for only .7 per cent of the variance (F = 188.35, p<.01) in the scores of the absorption in the task measure.

Interestingly, both informativeness and entertainment negatively predicted the absorption in the task (flow state) in adolescents. This means that higher levels of informativeness and entertainment in social networking usage were associated with a decrease in the ability to absorb in the task (flow state) in both urban and rural adolescents (β = −.80, .084).

Table 10 – Stepwise regression analysis of social media usage (dimensions) as predictor variables and absorption in the task (flow state) as a criterion variable

Predictors	*R*	R^2	Adjusted R^2	R^2 change	*Beta*	*F*	*F*-change	*t*-score
Informativeness	.806	.650	.648	.650	−.806	367.12**	367.12**	19.40**
Entertainment	.810	.657	653	.007	−.084	188.35**	4.00**	2.02*

**p<.01, *p<.05

Latent profile analysis

Figure 1 shows that the optimal number of profiles was determined to be 1, as it has the lowest BIC score (3301.88). After testing up to 10 profiles, results indicate that adding more profiles increased the BIC score, suggesting that the data does not support additional meaningful subgroups. In the single profile, the mean values across social media dimensions were close to zero, indicating no significant differences among participants in the dataset regarding social media dimensions (Socialization, Academic activity, Informativeness & Entertainment) and flow state (Challenges and skills, & Absorption in the task). This profile represents a generalized, average pattern of social media uses, implying that all participants in this study share a common set of behaviors or tendencies in terms of their social media use.

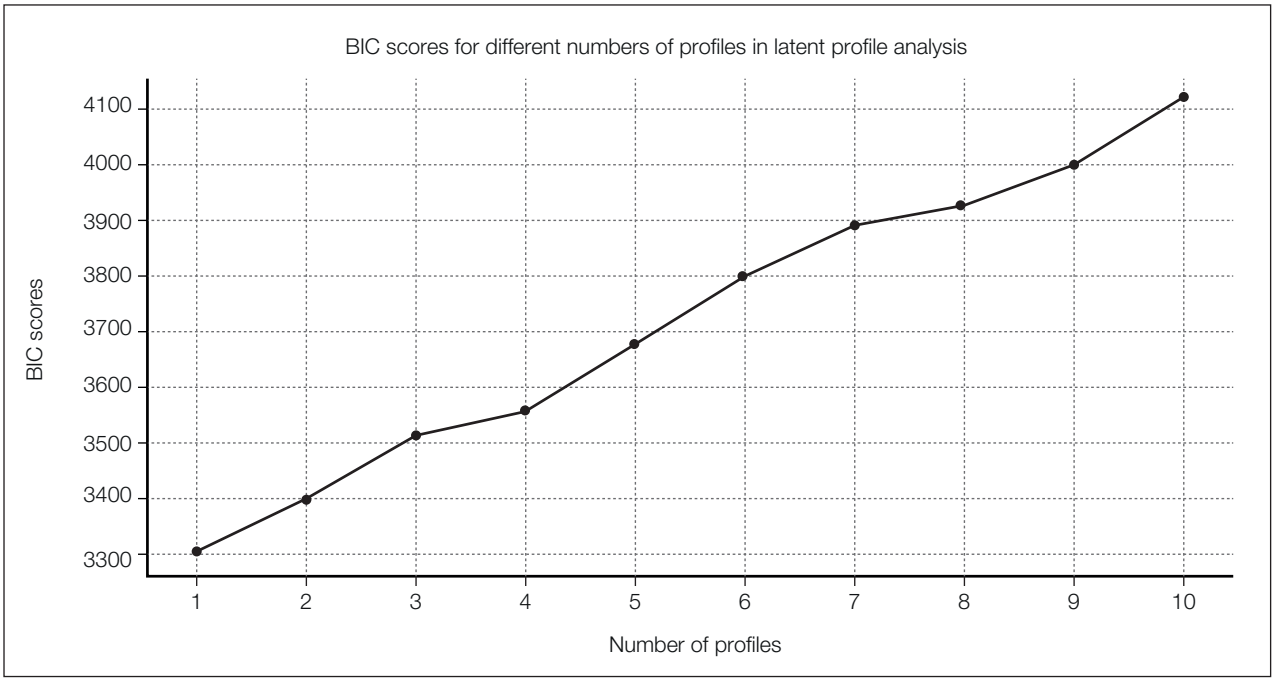
DISCUSSION

In this section the results are discussed in reference to the objectives and hypotheses of the study. Findings of the study have been discussed with the support of the earlier published studies and researchers' observation. Findings indicate that there was a significant difference in gender regarding academic activity of social networking usage. Although gender differences have also been found on different dimensions of flow-state and social networking usage but the difference were not found to be significant. Additionally, no obvious gender difference for adolescent psychosomatic symptoms was found. Previous researches that revealed active social media use had a large and beneficial impact on the sense of being in the flow is consistent with these findings. Furthermore, active social media use significantly and favorably affected academic self-efficacy (Yao et al., 2022). In contrast to the findings of the present study, it was also found that 73 per cent of students used social media for non-academic purposes, with the majority of them visiting the Facebook website. Socialization, informativeness, task engrossment, and psychosomatic symptoms were shown to be more significant in urban than rural participants when using social media, as were flow state and psychosomatic symptoms.

The results of the present study are consistent with previous studies' indicates that worries regarding the possible harm that social media (SM) use may do to adolescents' mental health is quite severe and long lasting. Concerns include the decline in in-person contacts, addiction-like behaviors, cyberbullying, peer pressure, and exposure to suicide stories on social media platforms (Baym, 2010; Bell, 2014; Kraut et al., 1998; Nie, Hillygus & Erbring, 2002; Robinson, Kestnbaum, Neustadtl & Alvarez, 2002).

On the other side, several researchers have emphasized the possible advantages of teenagers using social media. These consist of improved buddy connections, interactions with other groups that offer assistance, and chances for social contact and information access. Studies have indicated that college students who utilize the internet, including social media, report improvements in their social well-being, use of communication tools, and rise in in-person interactions and social contacts (Baym, Zhang & Lin, 2004; Kraut et al., 1998; Reid Chassiakos et al., 2016; Wang & Wellman, 2010). Overall, these findings suggest that while there are concerns about the potential negative effects of social media use, it also

Figure 1 – Scores of Bayesian information criterion (BIC) on latent profile analysis



offers opportunities for social connection and information access. The impact of social media on adolescents' mental health is a complex and multifaceted topic that requires further research and understanding.

The aim of the present research was to explore the relationship of social networking usage, psychosomatic symptom, and flow state. The findings of the study show that the dimensions of social networking use were found to be significantly correlated with psychosomatic symptoms of adolescents. Recent studies have highlighted a growing concern among medical and psychological professionals, as well as the public media, regarding child and adolescent users of audiovisual-based algorithmic social media platforms such as TikTok and WeChat. The studies have identified a troubling trend where users present with or claim functional psychiatric impairment that does not align with or fit into traditional psychiatric classifications (Haltigan, Pringsheim & Rajkumar, 2023). Regarding somatic complaints, a study conducted by Stiglic and colleagues (2022) found a correlation between higher computer use and an increased occurrence of headaches. The study specifically observed that headaches were more prevalent among computer science students compared to health science students. This suggests a potential association between excessive computer use and somatic symptoms, particularly headaches.

The regression analysis pinpointed that socialization and informativeness predicted psychosomatic symptoms. Two dimensions of social media use had a significant role in psychosomatic symptoms When taken as a whole, the studies show how teenage YouTube practices - both in terms of content production and consumption - constitute a dual process of social recognition that includes the ability to see oneself in others as figures with whom one can identify and a desire to be seen by others as valuable individuals. This connection is strengthened by the 'intimate confessional production format' as we have called it (Balleys, Millerand, Thoër & Duque, 2020). The concept of the looking-glass self is a significant component of Cooley's theory of socialization. According to this theory, self-image is formed based on perception of how others perceive us. Cooley proposed a three-step process for the construction of the self. Firstly, people develop an understanding of how we appear to others, considering their perspectives and evaluations of us. Secondly, we experience certain emotions or feelings, such as pride or embarrassment, based on our perception of how significant others perceive us. Thirdly, we imagine the

judgments or evaluations that these significant others may form about us based on their perceptions. In essence, the looking-glass self suggests that our sense of self is influenced by the perception of others and the judgments we believe they make about us. It highlights the social nature of self-formation, emphasizing the role of social interactions and the interpretations we derive from them in shaping our self-concept. Socialization in social media makes it so easy to engage in these three steps, the current trends and the number of likes define an individual's glass self. Socializing on Instagram is a kind of fake self or alternate reality of an individual, while taking a humanistic perspective we can see this as an incongruence between the ideal self and the real self and one of the study was reported that excessive use of social media is not disrupting the socialization power of an individual (Hassan, Saha, Saba, Tuhin & Das, 2019).

The study proposed a negative association between social media use and the flow state of adolescents. The dimension of socialization within social media use was found to have a significant relationship with the balance of challenges, skills and absorption in the task (both dimensions of the flow state). The regression analysis further predicted that socialization, entertainment, and informativeness would have a negative effect on the balance of challenges and skills, indicating either boredom or anxiety in the participants. Flow states, as described by Csikszentmihalyi, (2008) are states of optimal experience where challenges and skills are matched. The current study's findings of a negative relationship between the balance of challenges and skills suggest a deviation from the flow state, potentially indicating boredom or anxiety. Csikszentmihalyi's framework illustrates three regions of momentary experiences: flow, boredom, and anxiety, depending on the alignment of challenges and skills.

Flow itself is neither inherently good nor bad. It is a state that can lead to a more intense and meaningful life experience, as well as a stronger sense of self. However, flow can be achieved in both positive and potentially negative behaviors. For instance, a gambler may experience flow while playing, but eventually, the flow state will end, and the gambler is likely to lose (Csikszentmihalyi, 2008). Similarly, excessive use of social media among children and adolescents can restrict the flow state and may contribute to different mental disorders. In summary, the study suggests that social media usage can impede the flow state among adolescents, and excessive use may have negative consequences on mental well-being.

The study results suggest that the aspects of informativeness and academic engagement within social networking usage have a detrimental impact on the flow state. Moreover, the flow component of 'telepresence' on popular social media platforms such as TikTok and Instagram has been linked to increased levels of depression and anxiety. While these platforms may offer users an escape from their daily concerns, this coping mechanism may not be optimal and can contribute to mental health problems (Roberts & David, 2023).

The activation of the sympathetic nervous system, which is associated with anxiety, may be heightened by excessive social media use. The present study supports the idea that imbalances in mental health and the emergence of psychosomatic symptoms can be attributed to socialization on social media platforms. Other disorders related to social media use have been linked to sleep problems, addiction, anxiety, sex-related issues, behavioral issues, body image issues, physical inactivity, online grooming, headaches, visual problems, and dental issues. (Bozzola et al., 2022; Isham & Jackson, 2022).

The findings of the latent profile analysis (LPA) concluded that the single-profile solution suggests homogeneity in social media use patterns among the participants. This indicates that participants do not vary significantly across the observed dimensions; all groups use social media in a similar way, which in turn affects their flow state and psychosomatic issues. In other words, the dimensions selected in the study do not differentiate individuals within the participant group; instead, each group exhibits a similar pattern of social media use due to shared characteristics that were not captured by the analyzed dimensions.

Adolescent social media use should be considered seriously in terms of its socialization potential. Active participation on social media can encourage sound psychological growth, either directly or by improving the quality of friendships. It might, however, be at the expense of strained family ties and detrimental impacts on adolescent mental health. On the other hand, inaction and lack of communication can have a bad impact on friendships and family ties, causing unpleasant emotions and having a negative impact on child's healthy growth (Zhang, 2023).

The negative correlation between flow state and social media use suggests that boredom or anxiety may be present. In light of the psychosomatic symptoms observed, social media use was found to provoke anxiety in dimensions such

as stress, psychosomatic symptoms, and depression. Overall, findings highlight the importance of understanding the impact of social media use on mental health, particularly in terms of psychosomatic symptoms and the disruption of flow states. It is crucial to consider the potential negative consequences and promote healthy engagement with social media platforms, especially among adolescents.

Implications

Studies have been done on social media, flow state and its effect on depression and mental health, but there were very few studies which focus on the relationship of psychosomatic symptoms and social media use along with flow state. The study uses comprehensive analysis procedures and advanced statistical techniques. Adolescence is a major crisis beginning in the age, the turmoil of emotions may overpower them. While in a vulnerable state socializing is a challenge, which they are tackling through social media, but the effect is adverse. To control this awareness campaign may be started and naturally flow-inducing tasks should be given. Exploring one's own skillsets and polishing them will give a flow state which provides well-being. Social skills and socialization are to be taught in a practical way in a healthy manner without bullying. To enhance the student's flow state in the classroom, team flow should be maintained. Socializing in social media is to be bound with time. Innovative ideas regarding flow state are the need of the hour. Exposing to a diverse culture, encouraging students to take part in an organization so that they can make friends with those with similar hobbies. Assertiveness training should be given so that they can express themselves. A balance between offline and online socialization is needed. Increasing offline socialization can enhance well-being. Reading and creative art expressions are also required. Information overload is another villain. Application and sharing of knowledge using peer group discussions may help, as well as promoting volunteering activities. Academic activity was found to be higher in females. To enhance it, learning apps which give certain reinforcements, can condition ether gadgets to a learning platform rather than a social media user. Social media use may be restricted by implementing a written rule from the concerned government.

According to the findings, there are particular things parents can do to encourage the kids to experience more flow. They can receive feedback and have clear objectives from parents and significant others. Instead of solely concentrating on what might be advantageous to them in the distant future, parents can acknowledge what interests them right now. Parents can give kids the chance to decide what they do and to think about the effects of their decisions. Parents can motivate children to naturally provide activities they pick for their best effort. As they get older, they may be provided with opportunities to take on more difficult tasks.

Limitations

The self-report measure has been used in this study that has its own limitations, like social media use and participants could respond erroneously. The time duration of the study, sample size, and geographical location of the study might be expanded for generalization of the study.

Although the findings presented useful information but more empirical researches are required to overcome the gaps that has not been filled by this study. An experimental research design may help to explore the underlying brain mechanisms involved in a flow state. The time required for attaining flow after rewiring the effect of social media usage needs to be studied. Longitudinal study will be better. Identifying the brain mechanism involved in the socialization process helps in understanding the reward systems, which can be given in the real world.

The convenience sampling method was applied, which has limitations, such as issues with generalizability and potential researcher bias. The sample size of this study is also a concern, as it can limit the generalizability of the findings. Future studies should consider using more robust and scientific sampling methods with larger sample sizes to enhance the validity and generalizability of the findings. In this study, LPA was also applied; however, due to the small sample size, the findings of the LPA cannot be generalized.

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