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Sense of Agency as Psychological Mechanism Moderating Internet Addiction and Psychological Symptoms among Young Adults in India

Aakib Rahman Parray

aakibrahman979@gmail.com

St. Joseph University

Ishrat Munawer

SRM University, Andhra Pradesh

Khashiya Binte Mujeeb

Aligarh Muslim University

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Abstract

The rapid proliferation of digital technologies has led to increased concerns regarding internet addiction and its impact on mental health, particularly among young adults. The present study aimed to examine the relationship between internet addiction, sense of agency, and psychological symptoms, as well as to investigate the moderating role of sense of agency in this relationship. A sample of 437 young adults (M_{age} = 22.7 years, SD = 2.82) from various regions of India was selected using purposive sampling. The findings revealed a strong positive relationship between internet addiction and psychological symptoms, while sense of agency was negatively correlated with psychological symptoms. Structural equation modeling (SEM) indicated that internet addiction significantly predicted higher psychological symptoms, whereas sense of agency significantly predicted lower psychological symptoms. Importantly, the interaction effect between internet addiction and sense of agency was statistically significant, demonstrating that sense of agency moderates the relationship between internet addiction and psychological symptoms, such that higher levels of agency weaken the adverse impact of internet addiction. Further, the findings highlight internet addiction as a significant risk factor for psychological distress, while identifying sense of agency as both a protective and buffering mechanism. The study contributes to the existing literature by integrating a psychological resource variable within a structural framework, offering a more comprehensive understanding of mental health outcomes. The results have important implications for intervention strategies, emphasizing the need to enhance self-regulation and perceived control among young adults.

Introduction

The rapid expansion of digital technologies has fundamentally transformed the way individuals communicate, learn, and interact in modern society. The internet, while offering numerous advantages such as instant access to information and global connectivity, has also contributed to the emergence of problematic patterns of use. One such concern is internet addiction; a behavioral condition characterized by excessive, compulsive, and poorly controlled internet use that interferes with daily functioning and well-being (Young, 1998; Block, 2008). Over the past two decades, internet addiction has gained increasing attention as a significant public health issue, particularly among young adults who are highly engaged in digital environments (Richards, Caldwell & Go 2015; Parry & Khan, 2023; Chung & Lee, 2023).

Young adulthood represents a critical developmental stage marked by identity formation, academic pressures, and increased reliance on digital platforms for both educational and social purposes (Smith, Hewitt & Skrbis, 2015). Because the population is especially vulnerable to excessive internet use due to easy accessibility, social media engagement, and online entertainment (Helsper & Smahel, 2020). Research has consistently shown that problematic internet use is associated with a wide range of psychological symptoms, including depression, anxiety, stress, interpersonal sensitivity, and compulsive tendencies (Kuss & Griffiths, 2017). These symptoms reflect underlying psychological distress and significantly impair the individual's emotional and social functioning.

In addition to direct effects on mental health, emerging research suggests that excessive internet use influence an individual's sense of agency that refers to the subjective experience of being in control of one's actions and their outcomes (Haggard & Tsikaris, 2009). Sense of agency is a core component of self-regulation and psychological well-being, as it enables individuals to perceive them as active agents capable of influencing their environment (Moore, 2016). However, compulsive and habitual engagement with the internet may reduce perceived control over behavior, leading to a diminished sense of agency. Therefore, the concentrated sense of agency has been linked to various forms of psychological distress, including depression and anxiety, as individuals may feel less capable of regulating their actions and coping with life challenges (Bandura, 2001). In the context of internet addiction, individuals may experience a loss of control over their online behaviors, which can further exacerbate psychological symptoms. Thus, sense of agency may function as an important moderating mechanism through which internet addiction influences mental health outcomes.

Excessive internet use often reflects a failure in self-regulatory mechanisms, where individuals struggle to manage impulses and prioritize long-term goals over immediate gratification (Baumeister & Heatherton, 1996; Exelmans & Van den Bulck, 2021). Digital platforms are intentionally designed to maximize user engagement through reward-based features such as notifications, likes, and algorithm-driven content, which can reinforce habitual checking behaviors and reduce conscious control over usage patterns (Shahbaznezhad, Dolan & Rashidirad, 2021; Kleinberg, Mullainathan & Raghavan, 2024,). Over time, such repetitive engagement may weaken an individual's perceived autonomy and volitional control, thereby undermining their sense of agency. Therefore, the relationship between internet addiction and psychological symptoms can also be understood through the lens of cognitive-behavioral models. Davis (2001) proposed that maladaptive cognitions, such as beliefs about online superiority or social comfort in digital environments, contribute to problematic internet use. These cognitions may lead individuals to increasingly rely on the internet as a coping mechanism for negative emotions, thereby reinforcing a cycle of dependency (Longstreet, Brooks, & Gonzalez, 2019). As this cycle intensifies, individuals may experience heightened psychological distress, including symptoms of depression and anxiety. Importantly, diminished sense of agency may act as a central mechanism in this process, as individuals begin to perceive their behavior as less controllable and more automatic. Further, Empirical evidence shown that excessive internet use is associated with alterations in brain regions involved in reward processing, impulse control, and decision-making, such as the prefrontal cortex and striatum (Brand, Wegmann, Stark et al., 2019). These changes are similar to those observed in substance-related addictions, suggesting that internet addiction may share common underlying mechanisms. Impaired executive functioning in these individuals may further reduce their ability to exert control over their behavior, reinforcing both addiction and diminished sense of agency (Zou et al., 2017; Kurniasanti et al., 2019).

India has reported increasing levels of internet addiction among university students, along with significant associations with depression, anxiety, and stress (Gupta, Khan, Rajoura & Srivastava, 2018; Das & Pandey, 2023; Maheshwari & Preksha, 2018). However, most of these studies have focused primarily on direct relationships, without examining the underlying psychological processes that explain

these associations. The inclusion of sense of agency as a mediating variable offers a novel contribution by addressing this gap and providing a more comprehensive understanding of internet addiction affects mental health outcomes.

Methods

1. **Participants**

The sample consisted of 437 young adults aged between 16 and 30 years (M_{age}=22.7, SD=2.82) drawn from various educational institutions across India. Participants were selected using purposive sampling, and data were collected through online platform. Only those individuals who had regular access to electronic devices such as smartphones, laptops, and computers were included in the study.

2. **Tools**

Internet addiction was assessed using the internet addiction test (IAT) developed by Young (1998) (Chang & Law; 2008). It consists of 20 items rated on a 5-point scale (0–5), with total scores ranging from 0 to 100. Higher scores indicate greater levels of problematic internet use, with established cut-offs for normal, mild, moderate, and severe addiction. Similarly, *Sense of agency* was measured using a 13-item scale developed by Haggard et al. (2004) (Hurault, Broc, Crone, Tedesco & Brunel, 2020), assessing individuals' perceived control over their actions and outcomes. The scale includes both positively and negatively worded items and captures dimensions such as locus of control, self-efficacy, and belief in free will and higher scores reflect a stronger sense of agency. Finally, *Psychological symptoms* were assessed using the Brief symptom inventory (BSI; Derogatis, 1975), a 53-item self-report measure covering nine symptom dimensions including depression, anxiety, and interpersonal sensitivity. The items of the scale are rated on a 5-point scale (0–4), reflecting distress experienced in the past week.

Procedure

Prior to participation, informed consent was obtained from all respondents. The Internet Addiction Test (IAT), Sense of Agency Scale, and Brief Symptom Inventory (BSE) were administered online. Responses were automatically recorded and compiled in Google sheets for further analysis. After data collection, scoring was carried out according to the standardized guidelines provided in the respective manuals.

Results

Table 1 *Frequency Distribution of Socio-demographic Variables*

Variable	*Categories*	*N*	*%*
Gender	*Female*	201	46.0
	Male	236	54.0
Qualification	*Graduation*	209	47.8
	Secondary	102	23.3
	Post-graduation	126	28.8
Gadget Use	*Laptop*	106	24.3
	Desktop	43	9.8
	Tablet	118	27.0
	Smartphone	170	38.9
Region	*Punjab*	58	13.3
	Haryana	34	7.8
	Rajasthan	41	9.4
	Bihar	47	10.8
	Delhi	38	8.7
	Andhra-Pradesh	28	6.4
	Uttar-Pradesh	49	11.2
	Himachal Pradesh	26	5.9
	Jammu and Kashmir	34	7.8
	Goa	40	9.2
	Madhya Pradesh	42	9.6
Purpose of device use	*Entertainment*	69	15.8
	Education	57	13.0
	Social media	71	16.2
	Online shopping	68	15.6
	Communication	50	11.4
	Professional task	58	13.3
	Information seeking	64	14.6

Years of Gadget use	*3 years*	211	48.3
	5 years	147	33.6
	More than 5 years	79	18.1
Hours of internet usage	*1–2 hours*	196	44.9
	3–4 hours	164	37.5
	5–6 hours	77	17.6

N = 437

The *Table 1* presents the frequency distribution of demographic characteristics and patterns of internet use among the participants (*N = 437*). The sample comprised slightly more males (54.0%) than females (46.0%). In terms of educational qualification, the majority of participants were graduates (47.8%), followed by postgraduates (28.8%) and those with secondary education (23.3%). Regarding mode of device use, smartphones were the most commonly used devices (38.9%), followed by tablets (27.0%), laptops (24.3%), and desktops (9.8%). Participants were drawn from diverse regions of India, with the highest representation from Punjab (13.3%) and Uttar Pradesh (11.2%), while other states contributed relatively balanced proportions. With respect to purpose of device use, social media (16.2%) and entertainment (15.8%) were the most frequently reported activities, followed closely by online shopping (15.6%) and information seeking (14.6%). Educational (13.0%) and professional purposes (13.3%) were moderately represented, while communication accounted for the lowest proportion (11.4%). In terms of internet usage experience, nearly half of the participants (48.3%) reported using the internet for 3 years, followed by 5 years (33.6%) and more than 5 years (18.1%). Additionally, most participants reported spending 1–2 hours online daily (44.9%), followed by 3–4 hours (37.5%), while a smaller proportion (17.6%) reported 5–6 hours of daily internet use. Thus, the findings indicate a predominance of young, educated users with moderate internet exposure, primarily engaging in smartphone-based activities for social and entertainment purposes.

Table 2 *Correlations* ***among Internet Addiction, Sense of Agency, and Psychological Symptoms***

Variables	*M*	*SD*	1	2	3
1. Internet Addiction	53.65	2.59	—	.098*	.826**
2. Sense of Agency	44.75	1.42	.098*	—	-.394**
3. Psychological Symptoms	88.01	3.39	.826**	-.394**	—

Note. ***N = 437,*** *p* < .05*, **p* < .01

Table 2 shows the means, standard deviations, and Pearson correlations among internet addiction, sense of agency, and psychological symptoms (*N= 437*). The mean scores indicate that participants reported moderate levels of internet addiction (*M*= 53.65, *SD* = 2.59), sense of agency (*M* = 44.75, *SD* =

1.42), and psychological symptoms *(M* = 88.01, *SD* = 3.39). The Correlation analysis revealed a strong positive relationship between internet addiction and psychological symptoms (*r* = .826, *p* < .01), suggesting that higher levels of internet addiction are related with greater psychological distress among young adults. Further, the Internet addiction was also found to have a weak but statistically significant positive correlation with sense of agency (*r* = .098, *p* < .05), indicating a small relationship between these variables. In contrast, sense of agency demonstrated a moderate negative correlation with psychological symptoms (*r* = −.394, *p* < .01), suggesting that individuals with higher levels of perceived control over their actions tend to report lower psychological symptoms. Therefore, the findings suggest that internet addiction is strongly linked to increased psychological distress, whereas sense of agency appears to function as a protective factor, being inversely related to psychological symptoms.

The *Figure 1* presents the designed model to examine the effect of internet addiction on psychological symptoms and role of sense of agency. It aims to test the sense of agency interacts with internet addiction in influencing psychological symptoms. Additionally, the model accounts the relationships among the predictor variables. The detailed results of the model are explained and interpreted with the help of table 3 and 4.

Table 3 Regression Weights for Structural Equation Model Predicting Psychological Symptoms

Predictors	*β*	*S.E*	*C.R*	*P*	*Label*
Internet Addiction	1.104	0.011	101.734	< .001	A
Sense of Agency	-1.058	0.020	-52.751	< .001	B
Internet Addiction × Sense of Agency	-0.021	0.001	-27.894	< .001	C

Note. β = Regression Coefficient; S.E = Standard Error; C.R = Critical Ratio.

The *table 3* the regression analysis using structural equation modeling indicated that internet addiction significantly predicted psychological symptoms *(β = 1.104, S.E = 0.011, C.R. = 101.734, p < .001; label = A),* suggesting that higher levels of internet addiction are related with increased psychological distress among young adults. Sense of agency emerged as a significant negative predictor of psychological symptoms *(β = -1.058, S.E. = 0.020, C.R = -52.751, p < .001; label = B),* indicating that individuals with higher perceived control over their actions tend to experience lower levels of psychological symptoms. Furthermore, the interaction between internet addiction and sense of agency was statistically significant *(β = -0.021, S.E. = 0.001, C.R = -27.894, p < .001; label = C).* This finding suggests that sense of agency moderates the relationship between internet addiction and psychological symptoms, such that the adverse impact of internet addiction decreases at higher levels of sense of agency.

Table 4 Covariance among Variables in the structural Equation Model

Variables	*Estimate*	*S.E*	*C.R*	*P*	*Label*
Internet Addiction ↔ Sense of Agency	37.565	18.439	2.037	.042	D
Internet Addiction ↔ Interaction	350.397	483.554	0.725	.469	G
Sense of Agency ↔ Interaction	510.793	263.588	1.938	.053	F

Note. ↔ Indicates covariance between variables.

The *table 4 shows* the covariance analysis revealed a significant positive relationship between internet addiction and sense of agency *(Estimate = 37.565, S.E. = 18.439, C.R = 2.037, p = .042; label = D)*, indicating that these variables are statistically related within the model. However, the covariance between internet addiction and the interaction term was not statistically significant *(Estimate = 350.397, S.E. = 483.554, C.R = 0.725*, *p = .469; Label = G),* suggesting no meaningful association between these variables. Similarly, the covariance between sense of agency and the interaction term approached significance but did not reach the conventional threshold (*Estimate = 510.793, S.E. = 263.588, C.R = 1.938*, *p = .053; Label = F),* indicating a marginal relation that may warrant further investigation. Therefore, the covariance results suggest that while some relationships among variables exist, not all associations are statistically robust within the structural model.

Discussion

The study provides a comprehensive understanding of the interplay among internet addiction, sense of agency, and psychological symptoms among young adults. The findings revealed a strong positive relationship between internet addiction and psychological symptoms, indicating that excessive and maladaptive internet use substantially contributes to psychological distress. This result is consistent with prior empirical evidence demonstrating that problematic internet use is significantly related with depression, anxiety, and stress-related outcomes (Anderson, Steen, & Stavropoulos, 2017). Such relationships may be explained through the displacement hypothesis and behavioral addiction framework, wherein excessive online engagement interferes with real-life functioning, social relationships, and emotional regulation.

The observed weak yet significant positive correlation between internet addiction and sense of agency presents an interesting insight. Although counterintuitive, this finding may reflect the illusory sense of control experienced in virtual environments, where individuals perceive autonomy and mastery over digital interactions (Jung, 2011; Jeunet, Albert, Argelaguet & Lécuyer, 2018; Bandura, 2001). However, the relatively low magnitude of this relationship suggests that perceived agency may not be robust or functionally adaptive in real-world contexts.

In contrast, sense of agency demonstrated a moderate and significant negative association with psychological symptoms, highlighting its protective role in mental health. Individuals with higher perceived control over their actions tend to experience fewer psychological difficulties. This finding aligns with the principles of self-determination theory, which posits that autonomy and perceived control are essential for psychological well-being (Ryan & Deci, 2000). Similar findings have been reported in previous studies, where higher levels of perceived agency and self-efficacy are related with lower psychological distress and improved coping mechanisms (Gallagher, Lopez, & Precher, 2009).

The structural equation modeling results further strengthened these findings. Internet addiction emerged as a strong positive predictor of psychological symptoms, reinforcing its role as a significant risk factor. This is in line with earlier studies indicating that excessive internet use contributes to emotional dysregulation, cognitive impairments, and maladaptive behavioral patterns (Pettorruso, Valle, Cavic et al., 2020; Gioia, Rega, & Boursier, 2021).). Conversely, sense of agency was found to be a significant negative predictor, confirming its function as a psychological resource that mitigates distress.

Remarkably, the interaction effect between internet addiction and sense of agency was statistically significant; indicating that sense of agency moderates the relationship between internet addiction and psychological symptoms. Specifically, the negative interaction coefficient suggests that the detrimental impact of internet addiction on psychological symptoms is attenuated at higher levels of sense of agency. This finding is theoretically supported by resilience and coping frameworks, which emphasize the buffering role of personal control in reducing the negative impact of stressors (Cheng & Kim, 2019). Similar moderating effects have been documented in the literature, where constructs such as locus of control and self-efficacy weaken the relationship between risk factors and psychological distress (Shelley & Pakenham, 2004; Giblett & Hodgins, 2023).

The covariance analysis provided additional insights into the interrelationships among variables. The significant covariance between internet addiction and sense of agency suggests that these constructs are related within the model, although their association remains modest. However, the non-significant covariance's involving the interaction term indicate that while moderation effects exist at the predictive level, the shared variance among these variables is limited. This supports the conceptual distinctiveness of the constructs within the structural framework.

Therefore, the findings of the present study contribute to the growing body of literature on internet addiction and mental health by highlighting the dual role of sense of agency as both a protective and moderating factor. From a practical perspective, these results suggest that interventions aimed at enhancing individuals' sense of agency, self-regulation, and decision-making capacity may be effective in reducing the adverse psychological consequences associated with excessive internet use. Future research should consider longitudinal and cross-cultural designs to establish causal relationships and enhance the generalizability of the findings.

Implications

The findings of the present study carry important theoretical and practical implications. From a practical perspective, the results suggest that mental health interventions targeting young adults should not only focus on reducing internet addiction but also on enhancing sense of agency. Intervention programs may incorporate strategies such as self-regulation training, cognitive-behavioral techniques, and decision-making skill development to strengthen individuals' perceived control over their actions. Educational institutions and mental health professionals can design preventive programs that promote digital well-being, awareness about healthy internet use, and resilience-building. Additionally, policymakers may consider integrating digital literacy and psychological well-being modules into academic curricula to address the growing concerns related to excessive internet use. Furthermore, the moderating role of sense of agency indicates that strengthening internal control beliefs can reduce the negative psychological impact of internet addiction. Thus, therapeutic approaches that enhance self-efficacy, autonomy, and goal-directed behavior may be particularly effective in mitigating psychological distress among individuals at risk of internet addiction.

Further, the theoretically the study extends the existing literature on internet addiction by integrating sense of agency as a key psychological construct within a structural equation modeling framework. It highlights that internet addiction is not only a direct risk factor for psychological symptoms but also interacts with individual-level psychological resources. The identification of sense of agency as a moderating variable contributes to a more nuanced understanding of personal control mechanisms can buffer the adverse effects of behavioral addictions, thereby enriching models based on self-determination theory and social cognitive theory.

Conclusion

The study demonstrates internet addiction is a significant predictor of psychological symptoms among young adults, indicating its detrimental impact on mental health. In contrast, sense of agency emerges as a protective factor, negatively correlated with psychological symptoms and capable of buffering the adverse effects of internet addiction. The significant interaction effect further confirms that individuals with higher levels of perceived control experience a reduced impact of internet addiction on psychological distress. Therefore, the study highlights the importance of addressing both risk and protective factors in understanding psychological well-being. While internet addiction poses a substantial threat to mental health, enhancing sense of agency offers a promising pathway for intervention and prevention.

Declarations

Acknowledgement

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Informed consent

Informed consent was obtained from all participants prior to data collection. Participants were assured of confidentiality and the voluntary nature of their participation.

Ethical approval

The study was conducted in accordance with ethical standards and received approval from the Akal University ethical committee.

Data availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request, subject to availability and ethical considerations.

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication.

Clinical trial number

Not applicable, study did not involve any registered clinical trial or interventional clinical procedures requiring trial registration.

Consent to Publish

Applicable, all authors have given their consent to publish the research work.

Funding Declaration

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Authors' contributions

1. *Dr. Aakib Rahman Parray:* Conceptualization, Methodology, Data analysis, and Manuscript writing.
2. *Dr. Ishrat Munawer:* Conceptualization, Manuscript support writing, and Data Collection.
3. *Khashiya Binte Mujeeb (Ph.D. Scholar):* Writing and conceptual support and Conceptual Input

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Figures

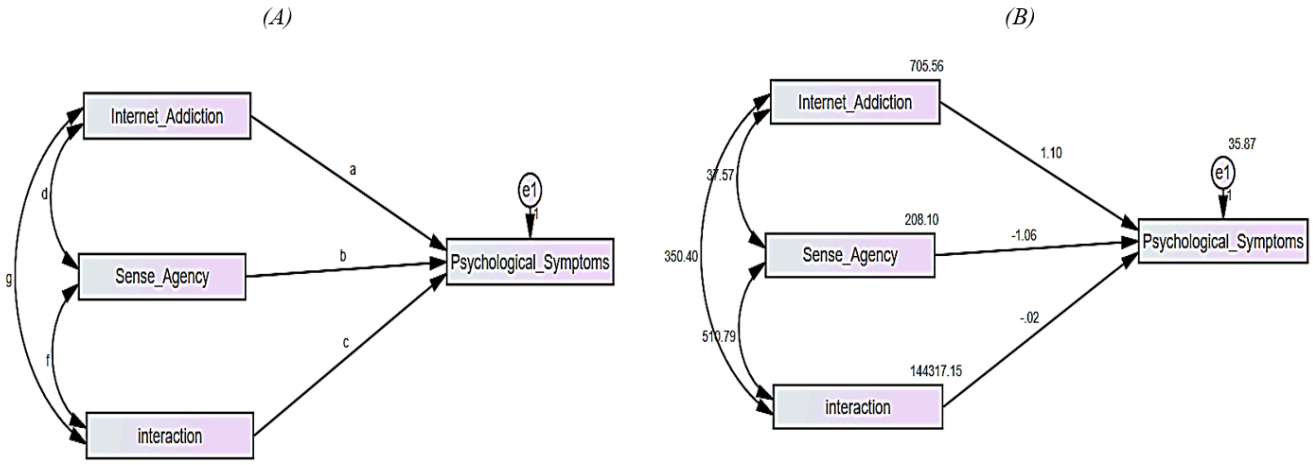


Figure 1

Structural Equation Model of Internet addiction, Sense of Agency and Psychological Symptoms