Internet addiction and online impulsive buying among university students: A cross-sectional study with regression and bootstrapped mediation

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Abstract

Background: University students frequently experience psychological distress. With the internet embedded in daily life, online activities, including online shopping may be used as coping strategies, but excessive use can contribute to internet addiction. Mechanism-oriented research also suggests that general online exposure may influence online impulsive buying through proximal processes such as internet addiction.
Purpose: This study aimed to determine factors associated with internet addiction among university students and to test whether internet addiction mediates the association between general online exposure (hours/day) and online impulsive buying.
Methods: A quantitative cross-sectional design was used among 386 university students at a campus in Kasihan, Bantul, Yogyakarta, Indonesia (January-April 2024) using convenience sampling. Internet addiction was measured using the Indonesian Internet Addiction Test (IAT) validated by Siste et al. (2021) (18 items; three-factor structure; Cronbach's α=0.855). Online impulsive buying was measured using the Impulse Buying Tendency Scale (IBTS) adapted to online context. Psychological distress was measured using the Depression Anxiety Stress Scale (DASS-42). Spearman correlations were used for bivariate analysis. Multiple linear regression identified predictors of internet addiction. A simple mediation model (PROCESS Model 4; 5,000 bootstrap samples) tested Duration → internet addiction → online impulsive buying, controlling for age, sex, DASS total, and online loan history.
Results: Mean internet addiction score was 40.57 (SD 13.86) and mean online impulsive buying score was 37.02 (SD 8.91). Internet addiction correlated significantly with online impulsive buying (ρ=.369, p<.001), depression (ρ=.163, p=.001), anxiety (ρ=.131, p=.010), stress (ρ=.147, p=.004), and Duration (ρ=.131, p=.010). In multivariable regression, online impulsive buying (B=0.673, p<.001) and stress (B=0.210, p=.002) were significant predictors of internet addiction (R^2=.215). In mediation analysis, the indirect effect of duration on online impulsive buying through internet addiction was significant (ab=0.1006, 95% bootstrap CI [0.0085, 0.2154]), consistent with an indirect-only mediation pattern.
Conclusion: Online impulsive buying and stress were significantly associated with internet addiction, with online impulsive buying as the strongest predictor. Internet addiction also mediated the association between general online exposure and online impulsive buying.

Keywords: internet addiction; mediation; online impulsive buying; stress; university students.

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Introduction

Students who reported higher academic stress also reported a general decline in their mental well-being (Barbayannis et al., 2022). A significant number of university students experience moderate to severe stress and depression (Kabir et al., 2023). Individuals experiencing significant stress or an inability

to handle stress may develop mental health issues, including depression and anxiety (NHS, 2023). The mental health of university students is significantly correlated with their level of stress management knowledge (Thaha et al., 2023). During the pandemic, the behavior of college students in terms of online purchasing was substantially influenced by their ability to manage stress. This research also demonstrates that female students are more likely to engage in online purchasing and use it as a stress-relieving activity than their male counterparts (Rahardjo et al., 2023).

The development of technology and the internet, along with the advent of online shopping, has significantly transformed shopping behavior. Buyers do not have to come to shopping places as usual (Abdul, 2022). Several shopping applications provide installment services so that many consumers shop online (Maesen & Ang, 2025). Bank Indonesia recorded that the value of e-commerce transactions reached IDR 44.4 trillion in July 2025, indicating growth of 2.32%. Public knowledge and marketplace promotional strategies drive this (Departemen Komunikasi Bank Indonesia, 2025).

When shopping, people usually do not have a strategy. This can lead to erratic purchasing behavior among consumers, so that impulsive purchases often occur (Setyawaati, 2022). People has made an unplanned purchase (Harahap et al., 2023). Islam prohibits this behavior. Surah al-Isra verse 27 explains that wasteful people are the brothers of Satan, who is deeply ungrateful to his Lord. The consequence of impulsive buying is regret over the purchase made. Some people even sacrifice their financial security to enjoy momentary pleasurable emotions (George & R, 2025). Online loans trap many unemployed students, encouraging them to adopt impulsive lifestyles and behaviors (Pangaribowo & Belarminus, 2023). Online promotions encourage them to make purchases (Hajati, 2023).

Reports indicate that 210 million people in Indonesia used the internet in 2022. This allows internet users to make more online transactions (Asosiasi Penyelenggara Jasa Internet Indonesia, 2022). In 2024, the percentage of internet users in the Special Region of Yogyakarta Province was 88,73%, and it is increasing every year (Sianturi, 2025).

Continuous use of the internet can cause addiction, which results in negative behavior (Brand, 2022). Technology, the internet, and digital impacts have a significant influence on students and college students in terms of their psychological development and health (Abueva et al., 2025). Internet addiction is a condition where someone uses the internet excessively and is unable to control it, resulting in negative tendencies (Gunawan et al., 2021). Internet addiction poses a significant risk to society today and in the future, particularly for the younger generation who heavily rely on technological devices in their daily lives (Mishra et al., 2024). Internet addiction is one of the factors that causes impulsive behavior. A wide internet connection makes it easier for someone to learn about offers and products. People often make impulsive purchases of items they've viewed online, even without prior planning (Nyrhinen et al., 2024). People who are always online find it easier to obtain information without realizing it, which encourages them to engage in impulsive online buying (Nyrhinen et al., 2023). According to a preliminary study, students frequently make impulsive purchases through e-commerce, fall victim to online loans, borrow other people's accounts or personal data for these loans, and experience increased stress as a result. This study is crucial in understanding the mental health conditions of students affected by impulsive buying behavior and internet addiction, enabling the development of effective strategies to prevent internet addiction in university students.

Materials and Methods

Design

A quantitative cross-sectional design with an associative approach was used to examine the association between the independent variable (independent variable) and the dependent variable (Sugiyono, 2025).

Sample and Setting

Participants were 386 university students recruited using convenience sampling at a campus in Kasihan, Bantul, Yogyakarta, Indonesia, from January to April 2024.

Variables

Internet addiction (IAT total score) was the primary dependent variable for the main regression model. Independent variables included online impulsive buying, depression, anxiety, stress, and Duration (hours/day).

Instruments

Internet Addiction Test (IAT): The Indonesian IAT validated by Siste et al. (2021) was used. The validated version contains 18 items rated 0–5 (0=never to 5=always), total range 0–90. It has three domains (silence/salience, neglect of duty, and loss of control) and good reliability (α=0.855) (Siste et al., 2021).

Impulse Buying Tendency Scale (IBTS), online context: The IBTS comprises 20 items across cognitive (10 items) and affective (10 items) dimensions, using a 4-point Likert response format with reverse scoring for unfavorable items. In a pilot validity test (n=40; r-table=0.312; α=0.05), items 11, 17, and 20 were not valid and were removed for the main analysis. Pilot internal consistency was acceptable (Cronbach's α=0.720; 20 items).

Depression Anxiety Stress Scale (DASS-42): DASS-42 includes 42 items across three 14-item subscales (depression, anxiety, and stress). For mediation models, DASS total (0–126) was used

as a covariate to reduce multicollinearity among subscales.

Ethics

Ethical approval was granted by the Health Research Ethics Committee, Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta (Approval No. 303/EC-KEPK FKIK UMY/XII/2023; issued December 27, 2023). Written informed consent was obtained from all participants, and data were anonymized.

Data collection

Data was collected using validated questionnaires administered to the respondents. Written informed consent was obtained from all participants after they were informed about the study objectives, procedures, and data management practices, including confidentiality and anonymization. Participants' identities were anonymized in all study reports.

Data Analysis

Univariate statistics (mean, SD) were computed. Spearman correlation was used for bivariate analysis. Multiple linear regression identified predictors of internet addiction. All statistical analyses were deemed statistically significant if the probability of error was less than 5% ($p<0.05$), and the confidence interval was established at 95% confidence. A simple mediation analysis (PROCESS Model 4; 5,000 bootstrap samples) tested whether internet addiction mediated the association between Duration and online impulsive buying, controlling for age, sex, DASS total, and online loan history.

Results

Descriptive statistics and bivariate correlations are presented in Tables 1–4. The multivariable regression model predicting internet addiction is presented in Tables 5–6. The bootstrapped mediation model is summarized in Table 7.

Table 1 reveals an average internet addiction score of 40.57, accompanied by a standard deviation of 13.861. Based on gender, men have a higher average addiction score of 40.95, and for >6 hours the average addiction score is 41.05, and the age with the highest addiction score is 19 years with a mean of 44.27.

Table 2 shows that students' average online impulsive buying score is 37.02, with a standard deviation of 8.912. Women are more impulsive than men. Duration >6 hours has a higher mean value than duration <0x7E>6 hours, which means they are more impulsive.

According to Table 3, the mean of depression, anxiety, and stress is higher in females than in males, and individuals who use the internet for more than six hours have a higher mean score of these conditions than those who use the internet for less than six hours.

Men use the internet more for online gaming activities, while women focus more on online shopping and interpersonal communication, and most associate internet abuse with game addiction (Xie et al., 2023). Males are more susceptible to experiencing a constant need to play online games,

Table 1. Description of internet addiction

Variable	Mean	Minimum	Maximum	Std.Dev	N
Internet Addiction	40.57	7	90	13.861	386
Sex					
Male	40.95	15	90	15.074	
Female	40.41	7	80	13.353	
Duration					
<6 hours	37.92	16	73	14.189	
>6 hours	41.05	7	90	13.769	

Table 2. Description of Impulsive Buying Online scores

Variable	Mean	Minimum	Maximum	Std.Dev	N
Impulsive buying online	37.02	17	68	8.912	386
Sex					
Male	35.54	17	68	9.613	113
Female	37.51	19	68	8.474	273
Duration					
<6 hours	36.78	19	68	9.651	59
>6 hours	36.96	17	68	8.719	327

Table 3. Description of Depression, Anxiety and stress scores

Variable	Mean	Minimum	Maximum	Std.Dev	N
Depression score	**10.51**	**0**	**42**	**9.67**	**386**
Sex					
Male	9.51	0	30	8.41	113
Female	10.93	0	42	10.93	273
Duration					
<6 hours	8.52	0	39	8.32	96
>6 hours	11.17	0	42	10.00	290
Anxiety	**11.41**	**0**	**42**	**9.05**	**386**
Sex					
Male	10.53	0	31	7.75	113
Female	11.77	0	42	9.50	273
Duration					
<6 hours	9.83	0	36	8.50	96
>6 hours	11.93	0	42	9.15	290
Stress	**12.67**	**0**	**42**	**9.52**	**386**
Sex					
Male	11.38	0	32	8.11	113
Female	13.20	0	42	10.13	273
Duration					
<6 hours	10.98	0	38	9.15	96
>6 hours	13.22	0	42	9.59	290

Table 4. Relationship between stress, anxiety, depression, internet addiction and impulsive online buying behavior in students

Variables	Internet Addiction	Impulsive Buying Online	Depression	Anxiety	Stress	Duration
1	1.000	.369**	.163**	.131**	.147**	.131*
	.	.000	.001	.010	.004	.010
	386	386	386	386	386	386
2		1.000	-.004	-.007	-.018	.072
		.	.934	.899	.730	.160
		386	386	386	386	386
3			1.000	.879**	.847**	.131*
			.	.000	.000	.010
			386	386	386	386
4				1.000	.909**	.114*
				.	.000	.025
				386	386	386
5					1.000	.140**
					.	.006
					386	386
6						1.000
						.
						386

Table 5. Regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.464c	.215	.209	12.32814

Table 6. Final model of internet addiction associated factor

Variables	B	SE	Beta	t	p-value
Impulsive Buying Online	0.673	0.071	0.430	9.451	0.000*
Stress	0.210	0.067	0.144	3.150	0.002*
Duration	0.237	0.137	0.080	1.735	0.083

B: parameter estimates, SE: standard error, Beta: standardized estimates, significant at *p < 0.05.

Multiple linear regression indicated that online impulsive buying (B=0.673, p<.001) and stress (B=0.210, p=.002) were significant predictors of internet addiction (R^2=.215).

Table 7. Bootstrapped Mediation (PROCESS Model 4; 5,000 samples)

Effect	Estimate	Inference
a: Duration → Internet addiction	0.3602	p=.0209
b: Internet addiction → Online impulsive buying	0.2792	p<.001
c: Total effect Duration → Online impulsive buying	0.1357	p=.1727
c′: Direct effect Duration → Online impulsive buying	0.0352	p=.6966
Indirect effect (ab)	0.1006	95% Boot CI [0.0085, 0.2154]

PROCESS mediation (Model 4) indicated a significant indirect effect of Duration on online impulsive buying through internet addiction (ab=0.1006, 95% bootstrap CI [0.0085, 0.2154]), while total and direct effects were not significant, consistent with an indirect-only mediation pattern.

spending more time playing than females (Mari et al., 2023). This occurs when exposed to game cues. Men with internet gaming disorder show lower brain activation areas (such as the posterior cingulate cortex (PCC) and higher anterior cingulate cortex/middle Para hippocampal gyrus) effective connectivity compared to women.

Frequent internet use contributes to the fear of missing out (FOMO), in various aspects of technology and cyberspace (Rautela & Sharma, 2022). Meanwhile, women tend to engage in impulsive behavior caused by high fear of missing out, followed by hedonistic and materialistic shopping motivations (Chetioui & El Bouzidi, 2023).

In addition, the lack of self-control in female students and marketing and promotional tactics can also influence online impulsive buying (Ekambareswarar et al., 2021). In the developmental stage, students enter the early adult development stage (19–35 years). Younger people tend to have higher levels of internet addiction compared to older people (Raymond & Kartasasmita, 2022). Internet addiction is thought to be more common in college students than in adults. Neurological and social vulnerabilities can trigger increased addiction.

The internet is widely available to students compared to the general public students can use the internet anywhere and at any time. me. The majority of students have personal gadgets with easy internet access; this risks causing internet addiction (Suhendra et al., 2023). Learning and assignments on the internet make them connect online more often. Someone who is addicted to the internet has a higher number of hours of use where they spend more than 5 hours playing the internet (Acharya et al., 2023). It is possible that the electromagnetic fields generated by gadgets have an effect on the autonomic nervous system (ANS), which modulates the circulatory system (BijaraniyaKuldeep & Kumar, 2022). In addition, internet addiction rates and stress levels among college students increase with increasing duration of internet use (Nakshine et al., 2022).

Based on Table 4, the bivariate test results reveal a significant correlation between internet addiction and online impulsive buying behavior in students (p = 0.000, r = 0.308). Additionally, there is a significant correlation between internet addiction and depression scores (p = 0.001, r = 0.163), anxiety (p = 0.010, r = 0.131), stress (p = 0.004, r = 0.147), depression and anxiety (p = 0.000, r = 0.879), stress and depression (p = 0.000, r = 0.847), and anxiety and stress (p = 0.000, r = 0.909).

We can interpret the correlation between internet addiction and online impulsive buying behavior in students as a weak, positive correlation. indicating that higher internet addiction scores are associated with slightly higher levels of impulsive buying. However, the strength of this association is small and should be interpreted cautiously with limited practical significance. The exchange of information via the internet influences interpersonal decision-

making in certain activities, such as purchasing behavior (Ngo et al., 2024).

Online trading tools on shopping platforms and social networking sites allow consumers to communicate with each other, and recommendations from influencers can stimulate unexpected online purchases (Olsen et al., 2022). Previous study stated that the internet significantly influences consumers' impulsive buying behavior (Jie et al., 2022). Additionally, Al-Huda et al., (2022) found that consumers with higher internet usage intensity easily succumb to attractive promotions and find it easier to make purchase transactions. The presence of e-payment and PayPal makes online shopping more attractive (Frihatini et al., 2026). The pay later feature is an alternative payment that makes it easier for consumers to get credit, which can trigger impulsive buying behavior. Convenience, speed, and lower interest rates encourage consumers to make impulsive purchases (Dzul Hilmi & Pratika, 2021).

Table 5

The final model that identifies the factors associated with internet addiction in this study was identified by the results of the multiple linear regression analysis presented in Table 6. The equation for internet addiction is 10.855 + 0.673 (impulsive buying online) + 0.210 (stress). In the regression analysis, stress and online impulsive buying emerged as the strongest statistical predictors of internet addiction ($p < 0.05$). Backward multiple linear regression was conducted to identify predictors of addiction score (N=386). The final model including impulsive buying online score, stress score, and duration was significant, $F(3,382) = 34.897$, $p<.001$, explaining 21.5% of the variance ($R^2=.215$; $Adj.R^2=.209$). Impulsive buying online score (B=0.673, β=0.430, $p<.001$) and stress score (B=0.210, β=0.144, $p=.002$) were significant positive predictors, while duration showed a marginal effect (B=0.237, $p=.083$) but was retained under the backward removal criterion ($p\geq.10$). Multicollinearity was not a concern in the final model (VIF=1.008–1.026). Visual inspection of residual plots suggested approximately normal residuals and homoscedasticity

Discussion

Cravings are significantly associated with impulse buying online (Rodrigues et al., 2021). Cognitive processes are implicated in the craving response that manifests in impulsive buying online (Müller et al., 2022). Online compulsive consumers devote an extensive amount of time to e-commerce websites in order to decide whether or not to make a purchase (Jameel et al., 2024). Impulsivity is elevated by online purchasing (Xu et al., 2022). Self-control has a negative and significant effect on consumptive behavior (Akmalia & Darmawanti, 2023).

People who have a proclivity for obsessive online purchasing behavior may have been encouraged to develop addiction (Ardyan et al., 2023). Online purchasing addiction is facilitated by low self-regulation in an online environment, which in turn leads to dissatisfaction with personal money management due to indebtedness (Nyrhinen et al., 2023). In the context of internet addiction and conflict processes, the craving process is associated with the anterior cingulate cortex (ACC), insula, putamen, and caudate (Sun et al., 2025). A group that was addicted to the internet exhibited increased activity in the bilateral dorsolateral prefrontal cortex. Stress influences internet addiction both directly and indirectly (M. Aziz et al., 2024). Mental health is associated with internet addiction (Jaafar et al., 2022). Anxiety partially mediated the impact of stress on Internet Addiction, and self-control moderated the relationship between stress and anxiety (Shen et al., 2023). Social class significantly moderates the association between stress and Internet addiction, as well as between stress and social anxiety. Social anxiety partly moderate the influence of social class on stress and Internet addiction, with the indirect moderating impact being 16.7% of the overall moderating effect (Kavici & Ayaz-Alkaya, 2024).

Despite its contributions, this study has several limitations. First, the use of self-reported questionnaires may have introduced response or social desirability bias. Second, the sample was not representative of the broader population, particularly individuals from diverse cultural backgrounds, which may limit the generalizability of the findings. Third, the cross-sectional design does not allow for the examination of causal relationships among the variables, as associations were assessed at a single point in time.

This study found that online impulsive buying and stress were significant predictors of internet addiction among university students. Bootstrapped mediation results suggest that general online exposure (hours/day) relates to impulsive online buying primarily through internet addiction, supporting a distal-to-proximal conceptualization (exposure → addiction → impulsive buying). Given the cross-sectional design, causal inference is limited, but the indirect effect provides evidence consistent with the hypothesized mechanism. Internet addiction positively impacts impulse buying (Fatmawati & Vernanda, 2024).

Community mental health nurses are ideally situated to implement these results via early identification, concise psychosocial treatments, and organized referrals and follow-up. Nurses frequently operate as the initial point of contact with student health services, and nurse-led initiatives in campus environments have demonstrated the capacity to enhance mental health outcomes via screening, education, and organized interventions (Russell et al., 2025). The importance of local wisdom in developing a sustainable and context-sensitive mental health framework for Muslim students (A. N. Aziz et al., 2026). Improving digital literacy can contribute to long-term improvements in mental

health (Setyaningrum & Suud, 2025).

Consequently, community mental health nurses can implement a stepped-care model on campus: (1) universal health promotion and "*digital wellbeing*" literacy, (2) targeted screening for students exhibiting high stress and/or impulsive purchasing behaviors, and (3) brief interventions aimed at enhancing adaptive coping and reinforcing self-regulation. Online and hybrid therapies are pertinent since systematic data indicates that online-based mindfulness effectively mitigates stress, anxiety, and depression among college students, hence correlating with your key predictor (stress) and the self-regulation mechanisms associated with addiction (Gong et al., 2023).

Limitations

Self-reported measures may introduce reporting bias. The cross-sectional design limits causal inference and temporal ordering. The sample was drawn from one campus setting, limiting generalizability.

Conclusion

Online impulsive buying and stress were significantly associated with internet addiction, with online impulsive buying emerging as the strongest predictor. Internet addiction also mediated the association between general online exposure and online impulsive buying.

It is recommended that community mental health nurses implement stepped care on campus: digital wellbeing education, targeted screening, followed by brief intervention and referral if necessary. Interventions should prioritize stress management and self-regulation, including online mindfulness options that have been proven to help reduce stress, anxiety, and depression among students. Nurses also need to coordinate digital mental health support with light monitoring, as well as collaborate with student affairs/finance units to educate students about debt risks and strengthen financial literacy in order to reduce triggers for impulsive purchases.

Declaration of Interest

All author declare no conflict of interest.

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Data Availability

None.

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