

Understanding Compulsive Digital Use among University Students: A Qualitative Analysis of Cue–Routine–Reward Loops.

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Abstract: University students are increasingly falling into compulsive digital habits in the current hyper-connected world. These behaviours are psychologically driven by triggers and the need for instant rewards. This study uses the cue–routine–reward (CRR) framework to investigate how situational and emotional cues influence college students' use of smartphones and social media. It explores how particular affective states like boredom, anxiety, and loneliness act as cues/triggers that lead to habitual digital routines for emotional consolation or social approval and hence create compulsive digital use. Despite increasing alarm about digital overindulgence among young adults, there has been limited qualitative work exploring the underlying mechanisms behind these behaviours. This qualitative descriptive research utilized reflexive thematic analysis with 30 university students (20 females and 10 males) aged 18–25 years who self-reported themselves as heavy users of smartphones and social media. Semi-structured interviews and one-week digital habit diaries were used to collect data. Participants were recruited using purposive sampling, and thematic saturation was achieved after 25 interviews. Data analysis utilized “NVivo-14(QSR international)”, using established qualitative procedures. Ten unique cue-routine-reward loops were identified through the analysis, with emotional states (boredom, anxiety, loneliness, stress) as primary cues for compulsive digital behaviours. Female participants exhibited greater emotion-focused coping and social validation-seeking patterns, whereas male participants exhibited greater distraction-related and compulsive checking patterns. The most common behavioural loops were Instagram scrolling to alleviate boredom, viewing comedy videos to manage anxiety, and WhatsApp checking to seek social connection. Contextual influences conditioned these patterns of behaviour, as study stress amplified emotion focussed coping patterns at exam times, social exclusion amplified behaviours of validation-seeking, and environmental contexts (classroom vs. home vs. bedtime) determining which cues prompted device use. Compulsive digital use in university students exhibits predictable behavioural patterns based on emotional regulation needs and not just exposure to screen time. These findings provide evidence-based intervention targets: environmental cue modification to target triggers of boredom and anxiety, behavioural friction tools to break up habitual checking and compulsive use routines, and alternative coping strategy training to substitute emotion-focused digital activity with more healthy stress management strategies. The ten CRR loops offer specific intervention points for addressing problematic digital behaviours in educational settings. The research concludes that students' problematic digital use is deeply rooted in anticipated behaviour loops satisfying psychological needs.

Keywords: College students, cue–routine–reward, compulsive digital use, emotional triggers, smartphone use, social media.

INTRODUCTION

Problematic digital use is the excessive and compulsive use of digital devices or platforms, which leads to neglect of everyday life and general well-being [1]. In this study it refers to habitual or compulsive use of smartphones and social media that interferes with daily functioning. Our focus is on describing underlying cue–routine–reward (CRR) processes that may underlie compulsive use and, in worse cases, may border on disorder-level behaviour [2]. The current study examined the mechanisms that maintain unhealthy digital use in university students with the cue–routine–reward model, a habitual behaviour model widely utilised to account for habit development [3]. This model demonstrates how revealing environmental cues evoke habitual digital use (routines) reinforced by social or psychological rewards.

College students form a particularly vulnerable group due to multiple converging factors. These include developmental stressors, academic demands, and social contexts normalising constant digital connection [4]. This study combines the CRR model with well-circulated theoretical frameworks such as I-PACE (Interaction of Person–Affect–Cognition–Execution), Habit Theory, and Fogg's/COM-B models to place students' mobile use in more general accounts of how compulsive habits develop and are sustained [5, 6, 7]. The research attempts to look beyond mere screen time measures to explore the psychological and situational factors driving routine patterns of device use. It is important to understand these theoretical underpinnings because current research has not thoroughly explored how these mechanisms play out in real life among college students.

Drawing on these theoretical findings, previous research has continuously reported on the alarming increase of problematic digital use among college students, associating excessive use of smartphones and social media with anxiety sleep disturbances, academic performance decrease, and decreased face-to-face communication [8]. Research has reported on the habits of compulsive checking, fear of missing out (FoMO), and psychological dependence on online validation [9]. Despite this theoretical foundation, empirical research has not adequately explored how these habits are motivated by the particular cue–routine–reward circuits that quietly reinforce daily digital use. We have yet to uncover the detailed triggers, the default responses they provoke, and the perceived rewards that round out this loop — information essential for crafting more precise solutions to counteract problematic digital use.

In light of such knowledge gaps regarding the precise mechanisms underlying maladaptive digital use, the present study was aimed at investigating the cue–routine–reward cycle as a reinforce of such behaviours in college students. Utilizing an in-depth qualitative description approach, the research carried out semi-structured interviews with purposively sampled college students between 18 and 25 years of age and captured their experiences and accounts about everyday digital consumption. It answered critical questions: What are the typical cues that prompt students to grab their devices [10]? What routines come after these cues, and what rewards support these habits? How do these components interact to reinforce digital habits? This question supposes that distressing digital use is not merely an effect of screen time but is rooted in micro-level behavioural mechanisms. Where device use chronically alleviates stress, boredom, or loneliness, the subsequent emotional payoff reinforces future usage through reinforcement learning processes. Reflexive Thematic analysis was used to analyse the data to chart out patterns consistent with the habit loop model [11]. By revealing such loops, this study attempts to bridge generalized observations to identify individual, pattern-based mechanisms that perpetuate compulsive behaviour and establishes an evidence base for purpose-specific interventions that adjust cues, add friction, and support better alternatives, complementing behaviour-change principles both of COM-B and Fogg's models. Through contextualizing these findings within well-established theories of problematic digital use and habit formation, we present a theoretically integrated explanation.

The overarching goal of this research is to investigate the impact that emotional and situational cues have on college students' habitual online behaviours, focusing on how these cues automatically trigger device use. The research also interprets how students explain these customary practices in terms of the cue–routine–reward (CRR) framework, shedding light on how these loops are sustained and felt as compulsive use of the gadget. Through examination of self-reported triggers, habits,

and perceived benefits, the study provides further insight into the psychological and environmental factors supporting issues with digital behaviour in university students.

This qualitative study sought to examine the self-reported triggers, habitual routines, and psychological rewards identified by participants. Although predominantly exploratory and qualitative in design, the research works on the basic assumption that internet overuse among college students is not so much a result of high screen exposure, but is more fundamentally entrenched in recurring habit patterns in which certain cues invariably trigger into routines that bring rewarding experiences, thereby sustaining the cycle [12]. By analysing these co-constituting factors, this research delivered a more sophisticated understanding of how students become and stay hooked to it, enabling more psychologically informed interventions for digital platform engagement. Participants often reported that using digital technology became more difficult to limit back on when it felt good, such as when it relieved stress or gave them social approval.

MATERIALS AND METHODS

Study Design

The study employed a qualitative descriptive design based on the cue–routine–reward (CRR) model to examine the nature of problematic digital use as a habitual action among college students. The goal was to gather rich, first hand descriptions of participants' activities, cues, and perceived rewards, yielding greater insight than can be gleaned from quantitative measures in isolation. Reflexive thematic analysis (RTA) was employed for analysis of all qualitative data.

Setting

The research was carried out in Tamil Nadu, India, at a highly rated institution that provides undergraduate degrees in arts, science, commerce, and law. The interviews were conducted both, face-to-face (campus) in pre-arranged private settings: university counselling rooms, empty classrooms, or online using secure platforms (Zoom/Google Meet), at the participants' preference. The environments allowed open conversation and naturalistic observations into participants' online activities ensuring audio quality for recording and privacy for sensitive discussions about digital habits.

Participants

- Participants were students of the university between the age group of 18 and 25 years who described themselves as heavy social media and smartphone users.
- Inclusion criteria: Heavy use was operationalized as self-reported smartphone use of ≥ 4 hours per day based on device screen data,

or self-described compulsive social media checking (≥ 10 time daily across platforms).

- **Exclusion criteria:** Students were excluded if they reported current psychiatric conditions that might significantly impair their ability to engage in interview or provide reliably self-report data.
- **Recruitment:** Participants were recruited purposively through campus bulletin postings, WhatsApp class groups, and word-of-mouth referrals. Interested students reached out to the research team directly and filled out a short online screening questionnaire to confirm eligibility.
- **Sample adequacy and saturation:** 30 participants were interviewed. Data collection proceeded until thematic saturation was reached—no new codes or cue–routine–reward patterns were identified after interview 25. Five further interviews verified that no new information was emerging, guaranteeing both the validity and information power of the sample.

Data Collection

All the interviews were carried out by the first author who has completed training in qualitative interviewing methodology. The interviewer had a neutral, non-judgmental attitude and adopted active listening skills to facilitate expansive responses. Consistency was ensured by having the same interviewer carry out all the sessions with the standardized interview guide with flexibility for follow-up probes.

Semi-Structured Interviews

Participants undertook comprehensive, semi-structured interviews about their digital habits, triggers, and emotional contexts, which lasted between 45–75 minutes allowing sufficient time for participants to fully explore their digital experiences while maintaining engagement. Before each interview, participants were reminded of confidentiality, their freedom to bypass questions, and permission to audio record. The interviewer started with demographic questions to establish rapport before moving on to digital habit exploration. Follow-up probes were employed when participants gave brief answers, for example, 'Can you tell me more about that?' or 'What does that look like in practice?' The interviews yielded rich descriptions of smartphone and social media use and how situational and emotional prompts influenced routine behaviours.

Table1. Open –Ended Questions for Exploring the Cue-Routine-Reward Loop in Compulsive Digital Use

S. No.	Question	Purpose
1.	"Describe what usually prompts you to pick up your phone during your daily routine?"	For investigating emotional, social, or situational motivations for initiating digital use.
2.	"List what you do once you start using your phone?"	To gain insights into habitual behaviour and digital use patterns.
3.	"What do you usually get out of using your phone or certain apps—how do you feel during or after using them?"	To examine emotional, cognitive/social reinforcement that sustains the behaviour.
4.	"Have you ever found yourself using digital media more than you intended to? If so, what do you think keeps drawing you back?"	To assess self-awareness and the felt compulsiveness of internet usage.
5.	"Have you ever tried to reduce or change your digital habits? What worked or didn't work—and why do you think that is?"	In order to have a concept of attempts at self-regulation and barriers to stop the behaviour cycle.

Table 1 lists the questions asked to the participants and their purpose. The open-ended questions underwent expert review by five experts — a clinical psychologist, qualitative research methodologist, professor of youth mental health, digital media specialist, and students' counsellor — to further enhance clarity, flow, and conformity to the CRR framework. All the interviews were audio-recorded with participants' permission. Interviews were transcribed verbatim within 48 hours. Transcripts were compared to recordings to ensure accuracy, and any identifying details were deleted during transcription.

Digital Habit Diaries

As a second data collection method, participants maintained a structured 7-day diary recording: Daily smartphone use, emotional states and triggers, and perceived rewards or consequences. Diary responses were uploaded electronically and transferred to NVivo-14(QSR International) for analysis according to the same coding scheme used for interview transcripts. Frequency count (Table 5) reveals how frequently particular cues and behaviours were expressed, without losing qualitative depth.

Diary Protocol and Coding Explanation

- All participants completed a 7-day diary recording:

1. Situational/emotional cues

2. Device use habits

3. Perceived rewards/consequences

- Individual entries for each participant were coded and subsequently compared with interview data.
- Diary codes were merged into the same codebook to maintain consistency.
- Frequency counts reflect the number of participants (not the number of diary entries) reporting each cue or habit.

Ethical Considerations

Ethics clearance for the research was provided by the Meenakshi Medical College and Research Institute Human Ethics Committee (Approval No.: MMCH&RI IEC/PhD/05/JUNE/23, June 15, 2023). Written informed consent was sought from participants before data collection, including formal permission for audio recording of interviews and for the submission of digital habit diaries.

To ensure confidentiality, participants were given pseudonymous ID codes (e.g., P1-P30), and personally identifying information was deleted during transcription. Data were safely kept on a password-protected, encrypted institutional server available only to the research team. According to institutional policy, all study materials would be kept for five years following publication and then erased permanently.

Participants were notified of their right to withdraw from the study at any point before anonymisation of data, without penalty. In order to protect participant well-being, interviews were conducted in a supportive setting, and participants could skip over questions or suspend interviews if any discomfort was felt. Contact information for on-campus counselling services and a 24-hour helpline was made available to any participant who felt emotional /distressed during or after taking part.

Data Analysis:

Aggregation of diary data: Participants' 7-day digital habit diaries were coded in accordance with the same coding scheme as the interviews. Coding was done participant by participant first, followed by aggregation in order to find recurrent cue–routine–reward patterns across participants. This enabled to verify if diary content supported interview findings and to record day-to-day variation in device use.

Use of frequency counts: Frequency counts (Table 5), was added to indicate how many participants referred to each theme. These figures are solely descriptive—used to mark salience and consistency of reported routines and cues—without suggesting statistical significance.

Validation and rigor: Periodic peer debriefing sessions involving two qualitative experts not affiliated with the project tested emerging interpretations. Member reflection involved presenting a thematic overview to eight participants, whose input (e.g., differentiating "academic stress" from "social pressure" as distinct cues) directly shaped theme refinement.

Analytic Appendix Template (codes ----Themes---- exemplar quotes)

Appendix A. Analytic Development and Supporting Data

A1. Demographic profile of Participants

Demographic variables	Groups	N (30)	(%)
Gender	Male	10	33.3
	Female	20	66.7
Age	19	15	50.0
	20	12	40.0
	21	3	10.0
Daily Screen time	2 – 3 hrs	8	26.6
	3 – 4 hrs	12	40.0
	4 – 5 hrs	8	26.6
	5 – 6 hrs	2	6.66

Most used app	Instagram	2	6.66
	WhatsApp	3	10.0
	Messenger	3	10.0
	Youtube	3	10.0
	Facebook	3	10.0
	Telegram	3	10.0
	Snapchat	3	10.0
	Netflix	3	10.0
	Spotify	3	10.0
	PUBG	4	13.3

A1 depicts that among the total 30 samples, 33.3% were male and 66.7 % were female, with an age between 19 and 21 years. Their daily screen time differed, with 26.6% having spent 2- 3 hours, 40% having spent 3-4 hours, 26.6% having spent 4-5 hours, and 6.66% having spent 5-6 hours. Thus, the majority of participants, 66% spent time between 3-5 hours/day. The most popular apps selected by the participants were: PUBG, used by 13.3%. Varied app patterns were observed, with no one app being clearly dominant, indicating a wide pattern of digital behaviour.

A2. Initial Open Codes-----Focussed Codes-----Themes

Stage	Examples
Initial open codes(n=45)	“Visiting different social networking sites during classes”, Viewing memes, videos to escape boredom”, Relief after viewing likes for posted content”
Focussed codes(n=18)	“Academic pressure cues”, “Social validation rewards”, Compulsive checking loops”
Final themes(n=10)	1. Emotional Coping as pattern 2. Academic Distraction as cue 3. Habitual Checking as routine 4. Digital Companion as routine/pattern 5. Social Validation as reward 6. Stress Coping as trigger 7. Low Self-Esteem as pattern 8. Compulsive Use as pattern 9. Life for Likes as reward 10.Social Disconnection as trigger

The focused codes shown in A2 were achieved through iterative coding and reflexive thematic analysis. The 45 initial open codes were generated from line-by-line transcript and diary record analysis. The open codes reflected distinct ideas, actions, or perceptions of students' use of digital media. Conceptually similar codes were grouped, formed, and combined into 18 focused codes that better reflected patterned meaning across the dataset through constant comparison and memo writing. These 18 targeted codes were subsequently analysed for semantic consistency and theoretical relevance and also combined into 10 broad themes that reflected the underlying basic psychosocial processes of problematic phone use.

A3. Theme Overview with Exemplar Quotations

Theme	Description	Exemplar Quotations (Participant ID)
Emotional Coping	Students employ phones to cope with negative feelings.	"When I feel sad, I just scroll endlessly to forget everything." (P12)
Academic Distraction	Device use due to academic stress as avoidance.	"I open YouTube whenever assignments pile up." (P04)

Habitual Checking	Repeated, automatic device checking without thinking.	"I don't even realize I'm unlocking my phone every few minutes." (P09)
Digital Companion	Phones are always emotional companions.	"My phone is like a friend; it's always there when I feel lonely." (P15)
Social Validation	Likes, comments, and shares serve as validation.	"I feel so valued when people react to my posts." (P07)
Stress Coping	Students use devices when stressed to get relief.	"Whenever I am stressed, gaming just calms me down." (P03)
Low Self-Esteem	Compensatory online behaviour caused by negative self-image.	"I feel more confident online than in real life." (P11)
Compulsive Use	Inability to stop or control phone usage despite wanting to.	"I tell myself I'll use it for 5 minutes, but it turns into hours." (P01)
Life For Likes	Students post content mainly to gain online approval and feel seen.	"I feel top of the world with numerous likes; or else I just delete it." (P15)
Social Disconnections	Boredom or anxiety during social situations leads to device usage.	"If no one talks to me in a gathering, I just pretend to text." (P08)

A3 provides an overview of the ten key themes identified through analysis, along with a short description and exemplar quotes from participants. This demonstrates how emotional, academic, and social cues initiate digital habits, reinforcing compulsive use through perceived rewards of relief, distraction, validation, or connection.

A4. Targeted Code Definitions and Functional Criteria

Code	Definition	Inclusion	Exclusion	Example
"Academic Pressure Triggers"	Situational or temporal prompts pertaining to academic pressures that trigger device use as avoidance or coping behaviour.	Cited instances of exams, assignments, study sessions, academic deadlines, or boredom in class as phone-use cues.	Non-academic tensions, social pressures, or nonspecific anxiety unrelated to academic context.	"I browse my phone whenever I am under pressure with exams." (P3)
"Emotional Distress Triggers"	Phone usage triggered by emotional states of sadness, frustration, anger, or other distress.	References to phone use to numb or escape from bad feelings.	Positive affect phone use (e.g., celebratory posts).	"When I'm upset, I just keep swiping reels until I feel better." (P7)
"Social Validation Rewards"	Reward for device use in the form of positive feedback like likes, comments, or follower numbers.	Expressions of direct happiness or pride based on online approval.	Neutral posting of content with no emotional stress given to approval.	"I feel like winning a trophy when my post crosses 1,000 likes." (P11)
"Compulsive Checking Loops"	Automatic and compulsive phone checking repeatedly, usually with little conscious effort.	Expressions of automatic unlocking, app-switching, or reflexive checking for notifications.	Deliberate checking for individual messages or calls.	"I open Instagram without even realizing I've done it again." (P14)
"Boredom-Driven Routines"	Use of the phone as a habitual reaction to free time or lack of stimulation.	References to scrolling in free periods, waiting times, or break times in classes.	Phone use during structured tasks or emergencies.	"Whenever I'm bored in lectures, I just keep browsing random videos." (P2)

"Anxiety Management Behaviours"	Use of the phone to self-calm or minimize feelings of anxiety.	Any mention of soothing nerves or preventing panic with the use of devices.	General stress reduction that has no relation to anxious sentiments	"I constantly check messages prior to presentations to calm my nerves." (P9)
"Loneliness Coping Mechanisms"	Employing phones to fill up social deficits or combat isolation.	Online interaction searching or passive scrolling when lonely.	Socialization in-person or face-to-face coping.	"When people are not around, I online chat just to not feel lonely." (P12)
"Procrastination Patterns"	Phone usage as a conscious delay strategy to shun academic or personal chores.	References to using devices to delay studying, assignments, or tasks.	Phone use planned after work is done.	"I scroll reels at midnight when I am supposed to be revising." (P1)
"Sleep Avoidance Scrolling"	Staying awake late in the night because of extended, unscheduled phone usage.	Complaints of scrolling social media or playing games rather than sleeping.	Late-night study or work-related phone usage.	"I remind myself it's just 10 minutes, but I find myself scrolling until 2 a.m." (P15)
"Notification Reactivity"	Acting on pings, alerts, or vibrations immediately, context irrelevant.	Statements indicating inability to disregard notifications.	Notifications looked at later at convenient	"Even in class, I glance at my phone as soon as it buzzes." (P4)
"Social Comparison Behaviours"	Comparing one's own life, looks, or accomplishments to classmates online.	Mentions of jealousy, inadequacy, or pressure arising from others' posts.	Neutral observations of peers' updates without self-judgement.	"Seeing my friends on trips makes me feel like I'm wasting my life." (P6)
"Validation-Seeking Posts"	Deliberate content sharing designed to attract approval or feedback.	Mentions of tailoring posts for likes, shares, or admiration.	Casual posting without concern for reactions.	"I only share selfies if I know they'll receive positive comments." (P16)
"Habitual Morning Checking"	Device use upon waking up as a regular routine.	Checking of messages or feeds on waking up early in the morning.	Use of phone later in the day or post-morning activities.	"I can't even brush my teeth without checking my messages first." (P13)
"Stress Relief Gaming"	Mobile game use, particularly to relax or prevent stress.	Mentions of gaming for calm, distraction, or fun under pressure.	Competitive or skill-driven gaming without stress context.	"Playing PUBG helps me cool down when I'm stressed about exams." (P18)
"Peer Pressure Conformity"	Device use shaped by fear of exclusion or desire to match peer habits.	Statements about using apps or joining groups because friends do.	Voluntary use independent of peer behaviour.	"All my friends are on this app, so I had to join too." (P10)
"Self-Regulation Failure"	Failing efforts to limit or control phone use.	Statements of uninstalling apps, using timers, or vows to cut down that don't work.	Instances when efforts at self-control work.	"I deleted Instagram last night but reinstalled it this morning." (P8)
"Digital Companionship"	Perception of the phone as a reassuring presence or companion.	Adjectives describing the device as always there, emotionally supportive.	Functional or purely practical device use (e.g., navigation).	"My phone is like my best friend—I never feel alone with it." (P17)

"FoMO-Driven Checking":	Device checking driven by the fear of missing key updates, news, or trends.	Frequent mentions of refreshing feeds, group chats, or notifications.	Looking for emergency academic or family messages only.	"I keep opening WhatsApp every five minutes just in case I miss something." (P5)
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A4 outlines targeted codes created through analysis, their definitions, inclusion and exclusion criteria, and examples. This coding system illustrates how certain triggers, behaviours, and rewards were systematically coded to identify the functional mechanisms behind students' compulsive online behaviour.

TRUSTWORTHINESS OF THE STUDY

Dependability

An audit trail was kept throughout the research, recording research decisions, modifications to the interview guide, and analytic decisions. The codebook was developed iteratively: early codes produced by the first author were independently applied to six transcripts by the second author. Differences were resolved through inter-coder discussion rather than the use of statistical measures of agreement, leading to more precise code definitions and more distinct thematic boundaries. Regular peer debriefing meetings were held with two qualitative research specialists of the project, which tested upcoming interpretations and validated analytic consistency.

Conformability

Reflexivity was maintained through journaling by everyone in the team to identify and manage personal presumptions and track possible bias. Bi-weekly peer debriefing meetings were held, in which analytic choices were examined. Member reflection was integrated through a thematic overview being shared with eight members, who validated resonance with their lived moments and proposed differentiating between "academic stress" and "social pressure" as drivers of problematic digital use. This feedback directly informed theme refinement, ensuring findings were grounded in participants' perspectives.

Transferability

To enable readers to judge transferability to other situations, a thick description of participant demographics, institutional context, and sociocultural context was offered. Themes were presented with varied, verbatim quotations to show variation in experience. Placing findings within an explicitly described context, an informed evaluation of the likelihood of these results transferring to comparable populations were provided.

RESULTS

This research used Reflexive Thematic Analysis to explore university students' accounts of mobile phone and internet use and found ten interlinked Cue-Routine-Reward habit loops of differing strength. Although behaviours were automatic, some students had strategies or individual values that broke these loops. The analysis, as presented in Tables 2–6, offers dense verbatim quotes and situational contrasts, providing social and psychological understanding of how the digital habits are created and maintained—dynamics that the quantitative measures alone were unable to pick up.

To support each theme, several verbatim quotations from participants are included. For instance, under the theme "Academic Stress as a Digital Trigger," P3 indicated: "I scroll through my phone whenever I feel overwhelmed by exams," whereas P7 observed: "Late-night messages distract me just when I need to study." Such quotations illustrate both similarities and differences in participant experiences.

Table2. Sample Quotes Supporting Each Theme

Theme	Participant quote	CRR Breakdown
		Cue----Routine----Reward
Escaping Reality	"I open YouTube to get fear out of my head, especially before internal exams."	Exam stress ----You tube---- Escape
Boredom Relief	"When I'm bored in class, I browse Instagram reels without even realizing it."	Boredom----Instagram--- Entertainment
Anxiety Soothing	"Laughing at funny shorts relaxes me before writing an exam"	Anxiety---comedy videos--- mood relief

Morning Habit	"Waking up first thing—I unlock my phone and open WhatsApp."	Wakefulness---Whatsapp---Feeling updated
Night time Scrolling	"Even if I'm tired, I still browse through reels at night until I fall asleep."	Insomnia---Instagram---Passive stimulation
Feeling Left Out	"Watching my friends hang out when they're not with me makes me keep checking their posts over and over."	Exclusion---Instagram stories---Social comparison
Seeking Validation	"I keep checking who has seen my story... it's like a habit."	Validation---Story posting ---Attention
Loneliness	"I send messages to people randomly just to think that someone's nearby."	Loneliness---Messaging---Connection
Peer Pressure	"Everyone does Snapchat—so I joined and don't feel left behind."	Social pressure---Snapchat---Inclusion
Avoiding Study	"I keep playing games rather than studying for my test."	Procrastination---Gaming---Escape
Habitual Checking	"Even without a message, I still open my phone."	Silence---Unlocking---Mental stimulation
Group Chat Habit	"I feel like I need to go through my class group or I'll miss something."	Obligation---whatsapp---Feeling updated
Attention Seeking	"I upload late at night so I get more impressions."	Popularity---Story posting---Engagement

Table 2 presents participant quotes that reflect the underlying cues, routines, and rewards (CRR) shaping their digital media practices. Each theme accounts for a specific psychological or situational cue—loneliness, boredom, anxiety, or social pressure—that activates a routine behaviour like scrolling, messaging, or posting, and which yields a perceived reward like entertainment, connection, or mood relief.

Table3. Thematic Summary Based on Cue–Routine–Reward (CRR) Loop

S. No	Theme	Cue	Routine	Reward
1.	Emotional Coping	Anxiety before exams	i)"I play funny videos at midnight to relax before an internal test". ii) "Whenever I'm irritated the night before my Semester, I delve into my phone — it distracts me". i)"Sometimes I don't touch my phone during exams because I'm too stressed to focus on anything else". ii) "If I'm feeling worried about my exams, I'd be more likely to go on a ride or just go to bed."	Feel calm and less anxious Feel too anxious
2.	Academic Distraction	Boredom during class	i)"When the class gets too boring, I just begin scrolling reels without even thinking". ii)"I reply to WhatsApp messages just to not fall asleep."	Pass time Looking around

			i)"If the lesson is dull, I doodle or look out of the window". ii)"If the lecture prolongs, I chat with my friend sitting next to me."	
3.	Habitual Checking	Notification sound or alert	i)"Whenever I'm at home alone, I just keep scrolling reels to pass time". ii)"Even when nobody messages me, I open my phone to see what's going on". i)"At home, my parents limit phone usage, so I tend to read or speak with them instead". ii) "I have a timer app, which cuts me off after 30 minutes — it really works".	Feel relieved of anxiety Feel restricted
4.	Digital Companion	Being alone	i)"My phone is like my best friend — I speak to it when I can't speak to anyone else"). ii)"Whenever I'm alone, I just keep scrolling; it's like I'm never alone". i)"I don't view my phone as a companion — it's just a tool for calls and study". ii) "I don't see my phone as a friend — it's just a device for information and communication."	Feel less lonely Feel detached
5.	Social Validation	Mood swings	i)"I am happy when my friends like my posts — I feel like they see me." ii) "If someone doesn't like my post, I feel I'm not good enough." i)"I post very seldom and don't care about likes." ii)"I rarely share updates and pay little attention to comments or reactions."	Get attention Feel unconnected

6.	Stress Coping	Assignment stress	i)"When I'm stressed for exams, the only thing that calms me down is scrolling reels." ii)"When I am stressed I watch videos to feel at ease." i)"If I'm stressed, I just sleep or speak with my sister — I don't touch the phone." ii) "I go for a walk whenever I am stressed."	Feel better Feel self-regulated
7.	Low Self-Esteem	Seeing others' posts	i)"If people like my post, then I feel good enough." ii) "Other people's perfect pictures make me feel motivated and engaged." i)"I don't compare myself to anyone on social media — I simply post what I enjoy." ii) "I focus on my own content and don't really notice how others respond."	Feel High Feel away
8.	Compulsive Use	Night time boredom	i)"Even when I know I should be studying, my hand picks up my phone automatically." ii) "I can't help scrolling even when I'm tired — it just happens." i)"I use a timer app to cut off after 30 minutes — it actually works for me." ii) "I rely on an app to remind me to stop, and it usually keeps me on track."	Feel entertained Feel controlled

9.	Life for Likes	Going out	i)"I feel happy when I get lots of likes; it means people notice me." ii) "I post late at night to gain more impressions." i)"I don't mind about likes; I only post when I actually want to post something." ii) I upload content for myself, not for anyone else's approval."	Feel seen Feel happening
10.	Social Disconnection	Being in a social setting	i)"Even when I'm with friends, everybody's on their phone — it's lonely." ii) "I speak less to my parents because I'm always online at night." i)"I ensure that I put the phone away during family dinner." ii) "I avoid using my phone when I'm with friends, even if I feel like checking it."	Distracted unknowingly Feel connected

Table 3 clearly shows the identification of 10 habit loops, exhibiting trigger, behaviour and outcome. Also, how various cues such as boredom, stress, loneliness, etc., result in phone use habits that yield instant emotional or psychological rewards? These strengthened the habit loops, which become more difficult to control.

Students' cell phone use varied from extremely automatic behaviours to patterns moderated by individual strategies or values. Each theme is exemplified with verbatim quotations showing both common and divergent experiences, as well as contextual variations among settings (home, class, bedtime) and time of day (exams vs. vacation).

Table5. Gender-wise Comparison of Cue–Routine–Reward Themes

S. No.	Theme	Male	Female	Commonality/Variance
1.	Emotional Coping	3	7	Higher in females
2.	Academic Distraction	8	3	Higher in males
3.	Habitual Checking	4	5	Common
4.	Stress coping	4	7	Higher in females
5.	Low Self-Esteem	4	5	Common
6.	Life for Likes	3	8	Higher in females

7.	Digital Companion	7	8	Common
8.	Compulsive Use	8	3	Higher in males
9.	Social Validation	5	7	Common
10.	Social Disconnection	8	6	Common

The examination did uncover significant gender variations in cue-routine-reward patterns, as compiled in Table 5. Female respondents are more often engaged in emotion-focused coping and social validation-seeking behaviour, whereas male respondents displayed stronger tendencies toward academic distraction and compulsive checking patterns. Certain themes, like habitual checking and electronic companionship, were frequently seen across the two genders.

Table6. Habit Loop Frequency Analysis (Aggregate Frequency across all Students)

S. No	Cue	Routine	Reward	Frequency across the week
1.	Boredom	Instagram Scrolling	Entertainment	26
2.	Anxiety	Watching Comedy Shorts	Mood Relief	22
3.	Loneliness	WhatsApp/DM Checking	Social Connection	20
4.	Notification	Unlocking Phone/Quick Reply	Instant Gratification	19
5.	Stress	Mobile Gaming (BGMI, etc.)	Escape, Rewarding Distraction	18
6.	Procrastination	YouTube Browsing	Escape from Tasks	17
7.	Envy	Viewing Others' Posts	Social Comparison	14
8.	Validation	Posting/Reposting Stories	Likes, Comments, Recognition	13
9.	Sleeplessness	Late-night Scrolling	Passive Stimulation	11
10.	Social Pressure	Using apps to maintain group image or stay updated	Peer Acceptance, Belonging	9

Table 6 shows the most common habit loops found among the students, and they illustrate that these are strong motivators for digital use. Many of the habits are emotionally driven coping mechanisms — having recourse to phones to manage stress, anxiety, or low moods.

DISCUSSION

This research employed reflexive thematic analysis to examine ten interrelated cue–routine–reward (CRR) loops outlining the manner in which college students utilize mobile phones in accordance with digital habit formation and problematic behaviours [13]. The results emphasize that students' compulsive use of digital technology is not a homogeneous phenomenon but structured by context and gendered oppositions [14]. According to the findings of the research, there are

discernible gender patterns in smartphone use among students [15]. Females showed greater emotional dependence on phone use, mainly for mood management through scrolling social media, “When I feel sad, I just scroll endlessly to forget everything” (Female, P12). “If nobody talks to me, I just keep texting so I don’t feel alone” (Female, P8). Seeking self-worth validation via likes and comments that reflected on their self-worth, “I feel on top of the world when my post crosses 1,000 likes” (Female, P11). “If people don’t like my post, I feel

I'm not good enough" (Female, P8). Resorting to reels or chatting as coping mechanisms with stress, "When exams stress me out, scrolling reels is the only thing that relaxes me" (Female, P3). Compared to females, males were found to have stronger compulsive and distraction-based behaviours, "Even when I know I should be studying, my hand picks up my phone automatically" (Male, P6). "I keep playing games rather than studying for my test" (Male, P10). With greater automatic checking habits, greater propensities for academic procrastination by gaming or scrolling while attending lectures, "When lectures get boring, I just scroll reels" (Male, P6), and a preference for task-based distractions such as gaming compared to seeking social support, "I play PUBG when exams pile up—it cools me down" (Male, P18). Nevertheless, females were found to have increased self-monitoring and control strategies, using timers and app restrictions more often than males, "I use a timer app to cut off after 30 minutes—it actually works for me" (Female, P14).

Contextual contrasts

Location: In class, students utilized phones to combat boredom, "When the lecture becomes boring, I begin scrolling reels" – P6. At home, parental restrictions occasionally limited usage, "My parents limit phone use, so I simply read or speak with them" – P11. At night, scrolling puts off sleep, "I intend to sleep at 11 but scroll through till 1 AM" – P17.

Timing: During exams, some students scrolled more to handle anxiety, "Scrolling reels settles me down during exams" – P3, while others avoided phones entirely, "I'm too anxious to use my phone during exams" – P14. Holidays brought lighter, boredom-driven use rather than stress-driven use. Together, these differences advance the I-PACE and Dual-process theories, demonstrating how the needs for emotional regulation and situational cues activate automatic processes, but also how reflective approaches and values can break the cycle [16, 17, 18].

Synthesis of CRR loops

Throughout all ten of the themes, boredom, anxiety, loneliness, and stress were often used as cues. The habitual activities — gaming, WhatsApp chatting, Instagram browsing, and posting to be validated — were rewarding psychologically in the short term with entertainment, connection, or relief. Notably, the negative cases reveal that the loops are not determined: friction tools, family support, and personal rules effectively broke them.

Connecting Each Theme to Global Theories and Interventions

1. Emotional Coping → Negative reinforcement → I-PACE Affect regulation

Students commonly employed phones to cope with low mood, loneliness, or anxiety. This illustrates negative reinforcement of the I-PACE model's affect regulation

pathway, where distress initiates device use that alleviates discomfort temporarily [19]. Looped emotional coping was more pronounced during exams but diminished during holidays.

Intervention leverage: Promote alternate coping strategies (e.g., relaxation habits, social support) and cue modification (limiting access during periods of high stress).

2. Academic Distraction → Cue-reactivity → Dual-process (automatic vs. controlled)

Classroom or study session boredom instigated scrolling or messaging automatically. This is consistent with dual-process theories, as rapid, automatic "System 1" actions suppress slower, more thoughtful "System 2" control [20].

Intervention leverage: Employ no-phone areas, lock-screen inhibitors, or study software to introduce friction and allow students time to regain intentional control.

3. Habitual Checking → Dual-process theory (impulsive vs. reflective) + automaticity

Students explained "checking for no reason", demonstrating automaticity with contextual cues eliciting behaviour without intent. According to dual-process theory, quick, cue-based System 1 impulsive checking overrules slower, deliberative System 2 goals as the reason for drifting into in-between-task checks [21].

Intervention leverage: implementation intentions and brief "pause" cues to reassert reflective control; self-monitoring and notification batching to cut cue-triggered impulses.

4. Digital Companion → Social reward → Reinforcement learning

Phones were labelled as "best friends," providing companionship when students were lonely. This illustrates variable social rewards supporting device use, in line with reinforcement learning models [22]. Students who perceived phones as neutral tools exemplified that the loop is belief-dependent, rather than predetermined. **Intervention leverage:** Enhance offline peer engagement and commitment devices (family rules, offline meals) to counter device-facilitated companionship.

5. Social Validation → Variable reward → I-PACE cue-reactivity and reinforcement learning

Likes, views, and comments were volatile rewards, stimulating posting and checking behaviours like gambling schedules. This is consistent with both reinforcement learning (variable ratio reward) and I-PACE cue-reactivity, wherein notifications power repeated checking strongly.

Leverage in intervention: Switch off notifications or encourage digital literacy training to aid students in assessing validation-driven use.

6. Stress Coping → Self-regulation theory + coping strategies (with negative reinforcement)

Assignment and test anxiety led to scrolling or gaming to "turn off". Self-regulation theory positions this as short-term regulation of emotion that interferes with goal-directed control; relief serves as negative reinforcement, increasing the likelihood of the coping habit next time [23]. Developing explicit coping skills (problem-solving, relaxation, and social support) decreases use of phones. Intervention leverage: Cognitive Behaviour Therapy-based coping (breathing, cognitive reframing), scheduled micro-breaks, and subtle friction tools (app timers, phone-free study blocks) to build self-regulation habits

7. Low Self-Esteem → Social comparison → I-PACE and dual-process

Some respondents felt inferior when posts were not receiving attention, as in social comparison loops where self-esteem sways with comments online [24]. In I-PACE terms, these are affective vulnerability factors combined with cue-based checking. Others defied comparison, demonstrating personal values that safeguard against this loop.

Leverage for intervention: Peer support groups and self-esteem building interventions might buffer against pressures of validation-seeking.

8. Compulsive Use → Executive dysfunction → I-PACE impaired control

Most reported automatic phone use, even when planning to study or sleep. This emphasizes executive control deficits (I-PACE) and persistence of habit, but protective cases (timers, app locks) demonstrated that voluntary friction is effective.

Intervention leverage: Commitment devices (app locks, accountability partners) and planned downtime routines reinstate conscious control.

9. Life for Likes → Variable reward → Reinforcement learning and cue-reactivity

Strategic posting to optimize impressions aligns with reward-based learning, in which intermittent social feedback maintains action [25]. Not all students were concerned with likes, verifying that individual attitudes determine cue salience.

Intervention leverage: Support intrinsic posting motivations (posting useful content) and digital literacy initiatives to minimize metrics-driven posting.

10. Social Disconnection → Social environment cue → Dual-process and habit theory

Students reported feeling "alone together," wherein social use of devices paradoxically erodes face-to-face

contact [26]. This is automatic checking prompted by group norms, not personal volition. Protective cases (dinner without phones) demonstrate purposeful boundary-setting interrupts the loop.

Intervention leverage: Group-based digital manners campaigns and offline social practices can curtail automatic checking in shared environments.

Integrating Findings with "habit formation and compulsive behaviour theory"

Throughout the ten themes, boredom, stress, loneliness, and anxiety were cross-cutting cues, prompting habits like scrolling, messaging, or posting that delivered immediate psychological rewards—entertainment, recognition, or social contact. These immediate rewards reinforce behaviour automatically, in line with reinforcement learning principles.

Dual-process models describe how impulsive device use disrupts deliberate intentions, and I-PACE pathways demonstrate how emotional regulation needs and impaired control sustain these loops. Self-regulation theory then explains how students with intentional friction tools (timers, app blockers, family rules) disrupted these automatic habits.

Practical Implications

The study's findings highlight that students' problematic digital use is not random but is patterned by discernible cue–routine–reward loops. Awareness of these loops provides a template for shaping context-specific and psychologically informed interventions. Students, counsellors, and universities themselves can use these findings to address key leverage points instead of making general calls for digital detox or general attunement. These include modifying high-risk situations (like study surfaces, classrooms, or bedtime routines), creating friction to prevent automatic checking, and promoting healthier coping mechanisms for stress and low mood. Notably, the findings identify that students already experiment with self-regulation efforts—utilizing app timers, parental controls, or other coping habits—indicating that loops, though influential, are not fixed. This points to the importance of integrating digital well-being into college life through workshops, peer networks, and counselling initiatives that legitimize reflective practices and adaptive boundaries. By orienting themselves towards the underlying psychological motivations of compulsive digital behaviour, effective interventions can transcend superficial recommendations to promote sustainable, healthful technology usage habits.

CONCLUSION:

This research examined the mechanisms through which cue–routine–reward loops perpetuate problematic digital use among university students and uncovered the psychological and environmental cues, routine habits, and perceived rewards that trigger compulsive device

use. Employing a qualitative descriptive study with reflexive thematic analysis, ten dominant habit loops were unravelled where emotional states—boredom, anxiety, loneliness, and stress—initiate repetitive digital activities, including scrolling through Instagram, texting using WhatsApp, online gaming, and viewing comedy videos. These behaviours offer immediate emotional comfort, social connection, or confirmation and show that problematic use is not just a matter of screen exposure but rooted in emotionally rewarding, contextually triggered habitual behaviours.

Connecting these findings to known frameworks—such as I-PACE, dual-process theories, reinforcement learning, and self-regulation theory—helped explain underlying mechanisms: emotional coping corresponds to negative reinforcement and affect regulation processes; habitual checking corresponds to automaticity and self-control failures; and validation-seeking or "life for likes" behaviours map onto reinforcement learning through variable reward schedules.

These findings identify unambiguous, actionable interventions. Context-adapted strategies range from environmental cue modification (e.g., silencing notifications, creating phone-free study areas) to behavioural friction tools (timers, lock-screen blockers, greyscale settings), implementation intentions (e.g., pre-specified alternatives to scrolling during boredom or distress), and commitment devices (peer monitoring, family policies). Supplemental digital literacy and mental health programmes can further encourage adaptive coping, curb overreliance on online affirmation, and facilitate healthier device use.

In conclusion, it is shown through this study that problematic digital use among students is a learnt, changeable pattern. Tracing micro-behavioural processes to habit and models of problematic use offers a behaviour-centred basis for creating individually tailored, psychologically grounded interventions capable of promoting balanced, goal-directed, emotionally sustainable digital habits.

Limitations and Directions for Future Research

The study used a small purposive sample of just 30 university students, all from a very narrow age range; thus, future research should include a more diverse and larger sample in different universities and among different age groups for better generalizability and capturing variations across populations. In order to bridge this limitation, research may employ random sampling techniques with more comprehensive demographic and cultural diversity, so that results are applicable outside a narrow student group. It also depended mainly on self-report measures like interviews and a one-week digital habit diary, thus prone to recall bias, social desirability bias, and under- or over-reporting of behaviour. Subsequent research should include objective digital monitoring measures, such as screen-

time apps or usage logs, to confirm and supplement self-report data. Merging self-report measures with passive digital data collection can reduce recall bias and give a truer representation of behaviours. While certain differences between genders were highlighted, the research did not thoroughly examine how personality or prior mental conditions could affect cue–routine–reward patterns. "As a qualitative study, this research does not test causal or statistical relationships between cues and digital use; rather, it provides an interpretive understanding of how participants describe these links." Subsequent research in this area should incorporate tested measures of mental health and personality, to assess how these elements influence personal cue–routine–reward loops. The addition of psychometric scales for personality and mental health would enable closer examination of how these factors impact digital habit formation. Its cross-sectional nature restricts the potential to make inferences about causal dynamics or the way in which the habit loops develop over time. Future research could have a longitudinal design to monitor changes in cue–routine–reward patterns and more precisely infer causality. Experimental or intervention-based research can be used to determine causal relationships by noting how altering cues or habits, affects compulsive digital use behaviours. A qualitative descriptive method was applied rather than a pure phenomenological approach, and the results report patterns of behaviour rather than invariant structures of experience.

Conflict of Interest

There is no conflict of interest.

Recommendations

This research demonstrates that compulsive digital use in students is sustained through cue–routine–reward loops triggered by boredom, anxiety, loneliness, and social validation needs. To neutralize these drivers, interventions need to transcend mere calls for "emotion-regulation-centred approaches" and rather use CRR findings to suggest concrete, context-specific strategies.

1. Environmental cue audits (for high-risk contexts)

Students can be guided to chart the moments, places, and moods in which phone use is triggered (e.g., in lectures, late in the evening, before an examination). Universities might include this in digital well-being workshops in which students map "hot spots" and create strategies for changing them (e.g., putting devices out of sight while studying, employing campus study areas as digital-minimal spaces).

2. Notification hygiene practices (to decrease external triggers)

Workshops can illustrate how to turn off unnecessary app notifications, batch notifications, or employ "focus modes." This minimizes cue-reactivity and automatic checking, particularly among those who report experiencing stress or validation-seeking loops.

3. Micro-breaks and implementation intentions (to break boredom loops)

The students can be taught to develop simple "if–then" plans like: "If I am getting bored in the class, then I take a 2-minute breathing break rather than opening Instagram". These short, formal alternatives break automatic scrolling patterns but fulfil the desire for a brief mental pause.

4. Lock-screen friction and commitment devices (to slow impulsive access)

Interventions might involve applying app timers, lock-screen timers, grey scale modes, or relocating distracting apps to nested folders. These strategies insert a couple of seconds of delay, providing the time for students to think again before acting on impulse.

5. Planned windows of connection and peer accountability (for social validation loops)

Universities might prompt students to set specific times to review messages or submit material, supported by peer support groups or student clubs. Such an approach re-contextualizes online interaction as considered instead of continuous.

6. Short CBT-informed exercises (for anxiety or stress triggers)

Counsellors may provide students with strategies such as "urge surfing" (observing and riding out cravings without responding) and "cognitive reappraisal" (rethinking distressing thoughts before scrolling). These may be built into orientation programs, mental health initiatives, or digital-wellbeing apps.

By associating each intervention with particular CRR patterns that emerged in this study, universities can provide specific, useful advice instead of general advice. These interventions are example trajectories rather than programs that have been tested and implemented, yet they present an evidence-based model for conducting future intervention research.

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REFERENCES

1. Dai, C., Tai, Z., and Ni, S. "Smartphone Use and Psychological Well-Being Among College Students in China: A Qualitative Assessment." *Frontiers in Psychology*, vol. 12, 2021, p. 708970. <https://doi.org/10.3389/fpsyg.2021.708970>.
2. Khatib, R., and Barki, H. "Habits in Organizational Contexts: Information Systems Routines, Cues, and Rewards." *Canadian Journal of Administrative Sciences/Revue Canadienne des Sciences de l'Administration*, vol. 37, no. 4, 2020, pp. 528–539. <https://doi.org/10.1002/cjas.1570>.
3. Rana, S. "Participatory Intervention Method to Reduce Smartphone Addiction and Screen Time of Undergraduates." *Journal of the Indian Academy of Applied Psychology*, 2024, p. 133.
4. Gu, X., and Mao, E. "The Impacts of Academic Stress on College Students' Problematic Smartphone Use and Internet Gaming Disorder under the Background of Neijuan: Hierarchical Regressions with Mediation Analysis on Escape and Coping Motives." *Frontiers in Psychiatry*, vol. 13, 2023, p. 1032700. <https://doi.org/10.3389/fpsyg.2022.1032700>.
5. Mehmood, A., et al. "Exploration of Psychological Mechanism of Smartphone Addiction Among International Students of China by Selecting the Framework of the I-PACE Model." *Frontiers in Psychology*, vol. 12, 2021, p. 758610. <https://doi.org/10.3389/fpsyg.2021.758610>.
6. Hawlader, M. D. H., et al. "The Art of Forming Habits: Applying Habit Theory in Changing Physical Activity Behaviour." *Journal of Public Health*, vol. 31, no. 12, 2023, pp. 2045–2057. <https://doi.org/10.1007/s10389-022-01766-4>.
7. Wang, L., et al. "Analysis of Willingness to Use Health Management APP for Female College Students: Application of UTAUT Model Based on Fogg Theory." *Frontiers in Psychology*, vol. 15, 2024, p. 1466566. <https://doi.org/10.3389/fpsyg.2024.1466566>.
8. Kolhar, M., Kazi, R. N. A., and Alameen, A. "Effect of Social Media Use on Learning, Social Interactions, and Sleep Duration Among University Students." *Saudi Journal of Biological Sciences*, vol. 28, no. 4, 2021, pp. 2216–2222. <https://doi.org/10.1016/j.sjbs.2021.01.010>.
9. Li, L., et al. "A Network Analysis Approach to the Relationship Between Fear of Missing Out (FoMO), Smartphone Addiction, and Social Networking Site Use Among a Sample of Chinese University Students." *Computers in Human Behavior*, vol. 128, 2022, p. 107086. <https://doi.org/10.1016/j.chb.2021.107086>.
10. Park, J., and Ok, M. W. "Use of Visual Prompts as a Pedagogical Strategy to Reduce Digital Distraction in College Classes." *TechTrends*, vol. 68, no. 2, 2024, pp. 325–337. <https://doi.org/10.1007/s11528-024-00930-9>.
11. Bell, B. T., Norminton, S., and Dollimore, K. "'I've Learned a Lot About Myself This Year': Young Student Women's Perceptions of Their Cumulative Use of Digital Fitness Technologies Across the Covid-19 Pandemic." *Journal of Health Psychology*, vol. 29, no. 9, 2024, pp. 1046–1058. <https://doi.org/10.1177/13591053231225598>.
12. Alcock, L., et al. "Study Habits and Attainment in Undergraduate Mathematics: A Social Network Analysis." *Journal for Research in Mathematics Education*, vol. 51, no. 1, 2020, pp. 26–49. <https://doi.org/10.5951/jresmetheduc.2019.0006>.

13. De-Sola, J., et al. “Cell Phone Use Habits Among the Spanish Population: Contribution of Applications to Problematic Use.” *Frontiers in Psychiatry*, vol. 10, 2019, p. 883. <https://doi.org/10.3389/fpsyt.2019.00883>.
14. Mog, R. K., and Gayan, M. A. “Reading Habits of Undergraduate Students in the Digital Environment: A Gender Perspective.” *Global Knowledge, Memory and Communication*, 2024. <https://doi.org/10.1108/GKMC-10-2023-0391>.
15. Graves, B. S., et al. “Gender Differences in Perceived Stress and Coping Among College Students.” *PLOS ONE*, vol. 16, no. 8, 2021, p. e0255634. <https://doi.org/10.1371/journal.pone.0255634>.
16. Lan, W. Y. “The Effects of Self-Monitoring on Students' Course Performance, Use of Learning Strategies, Attitude, Self-Judgment Ability, and Knowledge Representation.” *The Journal of Experimental Education*, vol. 64, no. 2, 1996, pp. 101–115. <https://doi.org/10.1080/00220973.1996.9943798>.
17. He, Y. Z., et al. “Longitudinal Links Between Time Perspective and Problematic Internet Use Among Chinese Adolescents: Testing a Dual-Path Model of Coping Style.” *Current Psychology*, vol. 43, no. 28, 2024, pp. 23517–23525. <https://doi.org/10.1007/s12144-024-06120-3>.
18. Brand, M., et al. “Current Interpretations of the I-PACE Model of Behavioral Addictions.” *Journal of Behavioral Addictions*, vol. 14, no. 1, 2025, pp. 1–17. <https://doi.org/10.1556/2006.2025.00020>.
19. Zaremohzzabieh, Z., et al. “Exploration of Vulnerability Factors of Digital Hoarding Behavior Among University Students and the Moderating Role of Maladaptive Perfectionism.” *Digital Health*, vol. 10, 2024, p. 20552076241226962. <https://doi.org/10.1177/20552076241226962>.
20. Flanigan, A. E., Babchuk, W. A., and Kim, J. H. “Understanding and Reacting to the Digital Distraction Phenomenon in College Classrooms.” *Digital Distractions in the College Classroom*, IGI Global Scientific Publishing, 2022, pp. 1–21. <https://doi.org/10.4018/978-1-7998-9243-4.ch001>.
21. Ma, L., and Yao, K. “Investigating Young Adults' Use of Internet Credit Services: A Reflective-Impulsive Dual-Process Model.” *International Journal of Consumer Studies*, vol. 47, no. 4, 2023, pp. 1434–1448. <https://doi.org/10.1111/ijcs.12918>.
22. Bhagat, S., Jeong, E. J., and Kim, D. J. “The Role of Individuals' Need for Online Social Interactions and Interpersonal Incompetence in Digital Game Addiction.” *International Journal of Human–Computer Interaction*, vol. 36, no. 5, 2020, pp. 449–463. <https://doi.org/10.1080/10447318.2019.1654696>.
23. Akinci, T. “Determination of Predictive Relationships Between Problematic Smartphone Use, Self-Regulation, Academic Procrastination and Academic Stress Through Modelling.” *International Journal of Progressive Education*, vol. 17, no. 1, 2021, pp. 35–53.
24. Servidio, R., et al. “Fear of Missing Out and Problematic Social Media Use: A Serial Mediation Model of Social Comparison and Self-Esteem.” *Addictive Behaviors Reports*, vol. 19, 2024, p. 100536. <https://doi.org/10.1016/j.abrep.2024.100536>.
25. Wadsley, M., Covey, J., and Ihssen, N. “The Predictive Utility of Reward-Based Motives Underlying Excessive and Problematic Social Networking Site Use.” *Psychological Reports*, vol. 125, no. 5, 2022, pp. 2485–2516. <https://doi.org/10.1177/00332941211025271>.
26. Parent, N., et al. “Social Disconnection During COVID-19: The Role of Attachment, Fear of Missing Out, and Smartphone Use.” *Journal of Research on Adolescence*, vol. 31, no. 3, 2021, pp. 748–763. <https://doi.org/10.1111/jora.12658>.