

One More Video: Perceived Productivity Loss Mediates the Relationship Between Instagram Doomscrolling and Bedtime Procrastination in Young Adults

Ashbeelah Shafaqat Ali^{1*}

¹ Senior Lecturer, Faculty of Media and Mass Communication, University of Central Punjab.
Email: ashbeelah@ucp.edu.pk

DOI: <https://doi.org/10.63163/jpehss.v4i2.1266>

Abstract

Late-night Instagram doomscrolling and compulsive consumption of short-form videos have become widespread among young adults, yet their mechanisms affecting sleep remain underexplored. This study examines whether perceived daily productivity loss mediates the relationship between doomscrolling and bedtime procrastination. A sample of 277 adults (ages 19–25) completed surveys assessing Instagram doomscrolling, perceived productivity loss, and bedtime procrastination. Results showed that higher doomscrolling frequency significantly predicted greater bedtime procrastination, with approximately 44% of this effect transmitted through perceived productivity loss. The findings suggest that the immediate gratification from short-form videos creates a subjective sense of wasted time, which paradoxically motivates individuals to stay awake longer in an attempt to compensate, forming a self-reinforcing cycle. The study extends Temporal Motivation Theory to digital media behaviours and sleep, highlighting that cognitive appraisal of time loss, not merely duration of use, drives bedtime delay. Implications for interventions targeting digital wellness and sleep hygiene are discussed, emphasizing strategies that address perceived productivity loss alongside self-regulation to reduce chronic sleep delay.

Keywords: Doomscrolling, Bedtime Procrastination, Productivity Guilt, Temporal Motivation Theory, Digital Media Use

Introduction

Sleep insufficiency is a mounting public health crisis, and a growing body of evidence implicates digital media use as one of its key behavioural drivers. A systematic review of 42 moderate-to-high-quality studies covering late adolescents and young adults (ages 16–25) found that social media use was consistently associated with shorter sleep duration and poorer sleep quality, with bedtime and nighttime use showing especially robust links to adverse sleep outcomes (Brautsch et al., 2022). A large meta-analysis synthesising 182 studies and over one million participants confirmed small but significant positive associations between social media use, depression, anxiety, and sleep problems, with problematic social media use showing stronger effects (Ahmed et al., 2024). Within this broad evidence base, however, a specific nocturnal behaviour has attracted enormous popular attention yet almost no empirical scrutiny: doomscrolling, the compulsive, repetitive consumption of short-form video content late at night, characterised by repeated self-promises of “just one more video” that are never honoured. Although the term circulates widely in public discourse and has been linked in preliminary research to anxiety, emotional exhaustion, and poor sleep (Sharpe et al., 2026), the psychological mechanisms through which doomscrolling specifically delays bedtime remain virtually untested. This gap is consequential: without understanding the mediating processes, interventions aimed at improving the sleep of the millions of young adults who doomscroll nightly have no clear target.

The dependent variable in the present study is bedtime procrastination, defined by Kroese et al. (2016) as going to bed later than intended without external reasons for the delay. In a nationally representative Dutch sample of 2,431 adults, Kroese and colleagues demonstrated that bedtime procrastination mediates the relationship between poor self-regulation and insufficient sleep, establishing the behaviour as a meaningful self-regulation failure rather than a trivial lifestyle preference. Subsequent work has confirmed and extended these findings. Chung et al. (2019) reported that high bedtime procrastinators spent roughly 451% more time on their smartphones in the three hours before bed compared with low procrastinators, and scored significantly higher on measures of depression, anxiety, and insomnia. A three-wave longitudinal study of 622 Chinese college students found bidirectional relationships between problematic smartphone use and bedtime procrastination, with self-control mediating both directions of this cycle (Chen et al., 2023). Together, these studies firmly establish that digital device engagement and bedtime procrastination are intertwined, yet they leave open the question of *which specific digital behaviours* drive the delay and *through what cognitive pathway*. The present study addresses this gap in a sample of 300 young adults (ages 19–25) who regularly use Instagram at night, combining a cross-sectional survey with a seven-day daily sleep diary.

This study draws on Temporal Motivation Theory (TMT; Steel & König, 2006) as a theoretical framework. TMT integrates insights from picoeconomics, expectancy theory, cumulative prospect theory, and need theory to explain why people systematically favour immediately rewarding activities over delayed but more valuable outcomes. The core formulation holds that the utility of a given action is a function of its expected value divided by the temporal delay to its reward, weighted by the individual's sensitivity to delay (i.e., impulsiveness). Doomscrolling fits this framework precisely: each new video delivers a small, immediate reward whose utility, because it is temporally proximate, disproportionately outweighs the distant and abstract costs of next-day tiredness. Steel et al. (2018) provided longitudinal support for TMT's predictions, showing that procrastination follows a hyperbolic pacing curve whose steepness is predicted by self-reported procrastination, and that critical self-regulatory skills, attention control, energy regulation, and automaticity, account for 74% of the variance in procrastination behaviour. TMT has not, however, been applied to bedtime procrastination in the context of social media doomscrolling, nor has it been used to explain the paradoxical compensatory behavior this study hypothesizes.

That paradox is the novel contribution of this study. Previous research has examined bedtime procrastination largely as a direct consequence of poor self-control or media displacement; people stay up because they cannot stop watching. This study proposes a more counterintuitive mediating mechanism: perceived daily productivity loss. Qualitative interviews with bedtime procrastinators reveal that a substantial subgroup engages in “deliberate procrastination”, wilfully delaying bedtime because they feel they deserve personal time, while others report “mindless procrastination” in which time simply “got away from them” during immersive activities like watching videos (Nauts et al., 2018). A related concept, “revenge bedtime procrastination”, has entered popular usage to describe people who sacrifice sleep to reclaim leisure time they felt was lost during the day. Building on these observations, the study hypothesizes that doomscrolling generates guilt over wasted time, a sense that the day was unproductive, which then motivates individuals to stay awake longer in an attempt to compensate for that lost productivity. Ironically, this compensatory behaviour produces further sleep delay, creating a self-reinforcing cycle. The mediating role of perceived productivity loss in the doomscrolling–bedtime procrastination link has never been empirically tested.

This study makes three primary contributions. First, it brings the widely discussed but empirically neglected phenomenon of Instagram doomscrolling into rigorous psychological research. Second, it tests a novel mediation model in which perceived productivity loss, not merely self-control failure, explains why doomscrolling leads to later bedtimes. Third, it applies Temporal Motivation Theory to the intersection of social media use and sleep behaviour for the first time, extending the theory's

explanatory scope to a domain where immediate digital gratification competes with long-term health goals.

Literature Review

Social Media Use, Sleep Disturbance, and Bedtime Procrastination

The relationship between social media use and poor sleep among young adults is now well-documented at the population level. In a nationally representative U.S. sample of 1,788 young adults (ages 19–32), Levenson et al. (2016) found that those in the highest quartile of social media use had nearly three times the odds of experiencing sleep disturbance compared with those in the lowest quartile, with a significant linear dose-response trend. The same research team subsequently demonstrated that social media use specifically during the 30 minutes before bed was independently associated with increased sleep disturbance, even after controlling for total daily social media use (Levenson et al., 2017). A comprehensive systematic review of 42 studies on digital media and sleep in 16- to 25-year-olds confirmed that social media use was particularly associated with later bedtimes and shorter sleep duration, more so than television or gaming (Brautsch et al., 2022).

While these findings establish the social media–sleep link, they do not explain the behavioural mechanism. Kroese et al. (2016) offered a pivotal conceptual advance by framing sleep insufficiency as a self-regulation problem. Their construct of bedtime procrastination, going to bed later than intended without external reasons, mediated the relationship between poor self-regulation and insufficient sleep in a representative Dutch sample of 2,431 adults. The construct quickly proved its utility. A systematic review and meta-analysis by Hill et al. (2022) identified 38 studies on bedtime procrastination determinants and confirmed that self-regulation, self-control, and chronotype were the most prominent predictors. Carlson et al. (2023) extended these findings with a 14-day daily diary study of 280 young adults, showing that bedtime procrastination was associated with later sleep timing, shorter sleep duration, and poorer sleep restoration at both within- and between-person levels, independent of chronotype.

The role of digital media as a specific vehicle for bedtime procrastination has received growing attention. Exelmans and Van den Bulck (2017a) modelled television viewing as a mediator of the self-control–bedtime procrastination relationship in a sample of 821 adults, finding that deficient TV self-regulation (the inability to stop watching) significantly mediated the path from low self-control to later bedtimes. In a follow-up, the same team demonstrated that binge viewing was associated with poorer sleep quality and more insomnia symptoms among young adults, and that cognitive pre-sleep arousal fully mediated these effects (Exelmans & Van den Bulck, 2017b). Jeoung and Suh (2020) found that high bedtime procrastinators spent the majority of their pre-sleep smartphone time on entertainment and communication applications, with video-watching time specifically correlated with depressive symptoms. Taken together, these studies point strongly to media-driven self-regulation failure as a proximal cause of bedtime procrastination, but they have focused on television and general smartphone use rather than on the specific behaviour of social media doomscrolling.

Doomscrolling: An Emerging but Understudied Phenomenon

Doomscrolling, the compulsive, repetitive consumption of social media content, often involving short-form videos, characterised by an inability to stop despite wanting to, has attracted substantial public attention but limited academic investigation. Sharma et al. (2022) published the first validated self-report measure of doomscrolling, a 15-item scale developed across two survey studies with OECD participants. Their validation work revealed that doomscrolling was closely related to online vigilance, problematic internet use, fear of missing out (FOMO), passive social media use, anxiety, and poor self-control. A recent scoping review by Sharpe et al. (2026) synthesised 17 empirical studies and concluded that doomscrolling was consistently associated with anxiety, depression, stress, and reduced resilience, though nearly all evidence was cross-sectional and conceptual definitions varied

considerably across studies. Camadan and Uzunoğlu (2025) tested a mediation model in 663 adults and found that doomscrolling predicted poorer sleep quality, with nomophobia (fear of being without one's phone) serving as a significant mediator, though FOMO alone did not mediate the relationship. Critically, none of these studies has examined doomscrolling specifically as a predictor of bedtime procrastination, nor has any tested the cognitive or affective mechanisms through which doomscrolling might delay sleep onset. The literature has focused on direct associations between scrolling and global sleep quality or mental health, without modeling the behavioral pathway, the actual act of staying up later, or identifying why individuals who scroll continue to delay bedtime even after they have stopped scrolling.

Perceived Productivity Loss and the “Revenge” Motivation

Qualitative research on bedtime procrastination has identified a motivation that goes beyond simple self-control failure. Nauts et al. (2018) conducted semi-structured interviews with 17 habitual bedtime procrastinators and identified three distinct subtypes: deliberate procrastination, in which individuals wilfully delayed bedtime because they “felt they deserved some time for themselves”; mindless procrastination, in which individuals “lost track of the time” during immersive activities; and strategic delay, linked to self-medicating for insomnia. Hill et al. (2023) replicated and extended these findings in 28 interviews with new career starters, identifying themes of “negative feelings before and during bedtime procrastination” and “wanting to versus knowing I shouldn't”, with participants emphasising the need for “me-time” as a primary driver of their delay. The concept of “revenge bedtime procrastination”, sacrificing sleep to reclaim personal time perceived as lost during a demanding day, has emerged in popular and increasingly in academic discourse. Azwar et al. (2024) defined it as “the choice of forgoing sleep in favor of leisure time due to a daily schedule devoid of adequate free time” and found a significant negative correlation with academic performance among 239 medical students. Khou et al. (2024) reported that 93.8% of their student sample cited busy daily schedules as the reason for delaying bedtime, with gadget use identified as the primary delay activity.

A parallel literature on social media and productivity guilt lends indirect support to the proposed mediating mechanism. Wang et al. (2021) used an experience sampling design with 155 employees over 10 workdays and found that daily social media use at work indirectly increased guilt through a chain of interruption and procrastination, which reduced work engagement. Gao (2023) introduced the concept of “time loss aversion”, the tendency to fear previous misallocations of time, and demonstrated that reframing social media use in cumulative terms (weekly, monthly, yearly) significantly motivated people to reduce their future use. These studies suggest that social media consumption generates a specific form of regret related to wasted time, and that this perceived productivity loss can motivate compensatory behaviour. What has not been tested is whether this same mechanism operates in the bedtime domain: that doomscrolling generates productivity guilt which, paradoxically, leads to further wakefulness as individuals attempt to “make up” for lost time.

Theoretical Framework: Temporal Motivation Theory

The present study adopts Temporal Motivation Theory (TMT; Steel & König, 2006) as its sole theoretical framework. TMT integrates insights from piceoeconomics, expectancy theory, cumulative prospect theory, and need theory into a single formulation: the utility of a given action is determined by the product of its expected value ($\text{Expectancy} \times \text{Value}$) divided by the sensitivity to delay multiplied by the temporal distance to the reward ($\Gamma \times \text{Delay}$). The theory predicts that individuals will favour immediately rewarding actions over delayed but more valuable ones, and that this tendency intensifies as the person becomes more impulsive (higher Γ) and as the delay to the valuable outcome increases. TMT has received strong empirical support in general procrastination research. Steel et al. (2018) demonstrated in a longitudinal study and a large correlational dataset ($N = 7,400$) that procrastination follows a hyperbolic pacing curve consistent with TMT predictions, and that critical self-regulatory

skills, attention control, energy regulation, and automaticity, accounted for 74% of the variance in procrastination. Turgeman and Pollak (2023) applied TMT to the ADHD–procrastination link and found that lower expectancy and higher impulsiveness partially mediated this relationship. Zhang and Ma (2024) provided what they describe as the first direct empirical evidence linking temporal discounting to real-world procrastination, finding a positive correlation between individuals' degree of future reward discounting and their procrastination on a long-term task. In the digital domain, Wilmer and Chein (2016) found that heavier mobile device users showed steeper delay discounting and weaker impulse control, and that impulse control mediated the relationship between device usage and delay of gratification.

Despite this extensive application, TMT has never been applied to bedtime procrastination in the context of social media doomscrolling. The present study extends TMT by proposing that doomscrolling represents a prototypical TMT scenario: each video provides an immediate, small reward (entertainment, novelty) whose temporally proximate utility outweighs the distant costs of next-day tiredness. The novel extension is that doomscrolling additionally generates a cognitive by-product, perceived productivity loss, which itself triggers a compensatory motivational process. Through the lens of TMT, the individual who has doom scrolled perceives a productivity deficit (reduced Value of the day's accomplishments) and attempts to restore this value by staying awake to accomplish more, even though the delayed reward of next-day productivity is further diminished by the self-control depletion and fatigue produced by the extended wakefulness. This creates a self-reinforcing cycle fully consistent with TMT's prediction that hyperbolic discounting leads to systematic preference reversals and regret.

Hypotheses

In summary, the existing literature demonstrates that (a) social media use is associated with poor sleep, (b) bedtime procrastination is a self-regulation failure that mediates the pathway between media engagement and sleep insufficiency, (c) doomscrolling is an emerging compulsive digital behaviour linked to anxiety and poor sleep quality but not yet studied as a predictor of bedtime procrastination, (d) qualitative evidence points to perceived time loss and "revenge" motives as drivers of deliberate bedtime delay, and (e) TMT provides a robust theoretical account of why immediate digital rewards are preferred over delayed sleep benefits. What is entirely missing from this literature is an empirical test of the mechanism connecting doomscrolling to bedtime procrastination, specifically, the mediating role of perceived daily productivity loss. Accordingly, this study proposes the following hypotheses:

H1: Higher Instagram doomscrolling frequency will positively predict greater bedtime procrastination.

H2: Perceived daily productivity loss will mediate the relationship between doomscrolling frequency and bedtime procrastination. That is, individuals who doom scroll more frequently will perceive greater daily productivity loss, which will in turn predict greater bedtime procrastination.

H3: At the daily (within-person) level, nights with more doomscrolling will predict later bedtime through same-night perceived productivity guilt.

Method

Research Design

This study employed a mixed-design approach combining (a) a one-time cross-sectional online survey to test the between-person mediation model (*H1* and *H2*), and (b) a 7-day daily diary to examine within-person mediation at the daily level (*H3*). The combination of cross-sectional and diary data enables testing whether the proposed mechanism operates not only across individuals but also within individuals across nights, which is critical for establishing ecological validity (O'Connor & Rogerson, 2024). This dual-level approach follows methodological precedents in sleep-diary research where between-person trait-level effects and within-person day-level fluctuations are modelled simultaneously using multilevel techniques (Carlson et al., 2023; Van Laethem et al., 2016).

Participants

A sample of 300 adults aged 19 to 25 years was recruited through purposive and snowball sampling via university classrooms. Eligibility criteria required that participants (a) were between 19 and 25 years old, (b) used Instagram at least five nights per week, (c) reported engaging in late-night scrolling behaviour (i.e., browsing Instagram content after their intended bedtime at least three nights per week), and (d) had no diagnosed sleep disorders. The target sample size of 300 was selected based on recommendations for mediation analysis using the PROCESS macro, where a minimum of 200 participants is generally recommended to detect small to medium indirect effects with 80% statistical power (Hayes et al., 2017). For the multilevel diary analyses, 300 participants each contributing up to 7 daily observations yields a maximum of 2,100 person-day observations, which exceeds the minimum requirements for stable multilevel mediation estimates. Participants provided informed consent prior to participation. The study was designed in compliance with ethical guidelines for research with human subjects.

Measures

Instagram Doomscrolling Frequency (Independent Variable). Instagram doomscrolling was assessed using a newly developed 8-item scale specifically designed for this study. Scale items were generated through a two-step process. First, the existing Doomscrolling Scale (Sharma et al., 2022) was reviewed for conceptual relevance. The Sharma et al. scale is a validated 15-item unidimensional measure of doomscrolling with good reliability, developed with OECD participant focus groups and expert panels. However, that scale was developed primarily in the context of negative news consumption during the COVID-19 pandemic and does not capture the entertainment-focused, short-form video scrolling behaviour central to the present study. Second, qualitative themes from Nauts et al.'s (2018) typology of bedtime procrastination, particularly the “mindless procrastination” category, in which individuals reported being “immersed in their evening activities” and losing track of time, were used to generate items specific to Instagram Reels/video browsing.

The resulting 8 items were rated on a 5-point Likert scale (1 = *never* to 5 = *always*). Example items include: “I scroll through Instagram videos late at night clicking one after another without really watching”, “I tell myself 'just one more video' but keep watching”, and “I lose track of time browsing Instagram at night”. Content validity was assessed by a panel of three researchers in media psychology who rated each item for clarity and relevance. Items were retained if all three raters agreed on relevance and clarity. To establish initial psychometric properties, an exploratory factor analysis was conducted on the full sample. Convergent validity was assessed through correlations with the existing Doomscrolling Scale (Sharma et al., 2022). The validation work by Satici et al. (2022), which confirmed the 15-item and 4-item forms of the Doomscrolling Scale across three studies and demonstrated strong associations with social media addiction, FOMO, and personality traits, provided additional convergent validity benchmarks.

Perceived Daily Productivity Loss (Mediator). Perceived productivity loss was assessed using a 6-item scale developed for this study. Items measured the subjective experience of having wasted time on Instagram and feeling unproductive as a consequence. Example items include: “I feel like I waste too much time on Instagram”, “My Instagram use makes me feel unproductive”, and “I regret how much time I spend browsing videos”. Items were rated on a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*). This scale was informed by Wang et al.'s (2021) finding that daily social media use at work indirectly increased guilt via interruption and procrastination, and by Gao's (2023) concept of “time loss aversion”, the tendency to experience regret over past misallocations of time to social media. For the daily diary, a shortened 3-item version was administered each evening, asking participants to rate that day's perceived productivity loss attributable to Instagram use.

Bedtime Procrastination (Dependent Variable). Bedtime procrastination was measured using the Bedtime Procrastination Scale (BPS; Kroese et al., 2016). The BPS is a 9-item self-report instrument

rated on a 5-point Likert scale (1 = *(almost) never* to 5 = *(almost) always*). Example items include: “I go to bed later than I had intended” and “I easily get distracted by things when I actually intend to go to bed”. The BPS has been validated across multiple languages and cultures, with a recent meta-analytic reliability generalization study by Oyar et al. (2026) estimating the pooled Cronbach's alpha at .855 (95% CI [.843, .865]) across 127 studies and the pooled McDonald's omega at .867 (95% CI [.834, .894]) across 11 studies. Cross-cultural validation studies have consistently confirmed the scale's unidimensional or two-factor structure with strong internal consistency and convergent validity with general procrastination and self-control measures (An et al., 2019; Brando-Garrido et al., 2021).

7-Day Sleep Diary. Following the one-time survey, participants completed a daily online diary for seven consecutive nights. Each diary entry was completed in two parts: an evening entry (completed before bed) and a morning entry (completed upon waking). The evening entry assessed: (a) Instagram doomscrolling that day/evening using 3 items adapted from the full 8-item scale, (b) perceived productivity loss that day using 3 items from the full 6-item scale, and (c) intended bedtime for that night. The morning entry assessed: (a) actual bedtime the previous night, and (b) a single-item rating of bedtime procrastination (“Last night, I went to bed later than I intended”; 1 = *not at all* to 5 = *very much*). The discrepancy between intended and actual bedtime (in minutes) served as an objective measure of bedtime delay. This diary design follows established protocols in bedtime procrastination research, including Carlson et al.'s (2023) 14-day diary study in *Sleep Health* and Kühnel et al.'s (2018) daily diary study of chronotype and bedtime procrastination.

Control Variables. The following variables were assessed at baseline and included as covariates in all analyses: (a) general procrastination, measured with the General Procrastination Scale (Lay, 1986); (b) chronotype (morningness at eveningness), assessed with the reduced Morningness-Eveningness Questionnaire (Adan & Almirall, 1991); (c) work/study schedule (hours per day); and (d) presence of any known sleep disorder (used as an exclusion criterion).

Procedure

Participants were recruited through the university department. Eligible participants first completed the online cross-sectional survey, which included all full-length measures (the 8-item Instagram Doomscrolling Scale, the 6-item Perceived Daily Productivity Loss scale, the 9-item BPS, and all control measures). This survey took approximately 15 to 20 minutes to complete. Participants were then enrolled in the 7-day daily diary. Each evening at 21:00, participants received an automated notification via email or text message with a link to the evening diary. Each morning at 08:00, they received a notification for the morning diary. Participants who completed at least 5 of 7 diary days were retained for within-person analyses. Based on compliance rates reported in similar diary studies (e.g., O'Connor & Rogerson, 2024, reported adequate compliance with twice-daily diaries over 7 days), we anticipated a minimum of 85% completion.

Analytic Strategy

Cross-Sectional Mediation (H1 and H2). The between-person mediation model was tested using Hayes' (2013) PROCESS macro for SPSS, Model 4, with 5,000 bootstrap resamples to generate 95% bias-corrected confidence intervals for the indirect effect. In this model, Instagram doomscrolling frequency served as the independent variable (X), perceived daily productivity loss as the mediator (M), and bedtime procrastination as the dependent variable (Y). General procrastination, chronotype, and work/study hours were entered as covariates. The total effect (path c), the direct effect (path c'), and the indirect effect ($a \times b$) were estimated. Mediation was supported if the bootstrap confidence interval for the indirect effect did not include zero (Hayes et al., 2017). The PROCESS macro was selected over structural equation modelling for this observed-variable mediation model because, as Hayes et al. (2017) demonstrated, the results are "largely identical" for observed-variable models, and

PROCESS provides a more straightforward implementation of bootstrapped confidence intervals for indirect effects.

Multilevel Mediation (H3). The daily diary data were analysed using multilevel structural equation modelling (MSEM) to test within-person mediation. Daily observations (Level 1) were nested within persons (Level 2). Following recommendations from Cheung and Thomas (2018), we employed MSEM rather than conventional multilevel modelling because MSEM can simultaneously estimate within-person and between-person mediation effects and provides unbiased estimates when a person-level variable serves as a predictor. All Level 1 predictors (daily doomscrolling, daily perceived productivity loss) were person-mean centred to separate within-person from between-person variance. The Level 1 model tested whether evenings with more doomscrolling predicted greater same-evening perceived productivity guilt (path a_{within}), whether same-evening productivity guilt predicted greater bedtime discrepancy that night (path b_{within}), and whether the within-person indirect effect ($a_{within} \times b_{within}$) was significant. The Level 2 model simultaneously tested the between-person mediation effect using person-level means. Models were estimated in Mplus 8.8 using maximum likelihood estimation with robust standard errors (MLR). Significance of indirect effects was assessed using Monte Carlo confidence intervals with 20,000 repetitions.

Results

Preliminary Analyses

Of the 300 participants recruited, 14 were excluded for failing attention checks and 9 for completing fewer than five of seven diary days, yielding a final analytic sample of 277 participants (188 female, 82 male, 7 non-binary; $M_{age} = 21.64$, $SD = 1.89$). On average, participants reported using Instagram for 2.31 hours per day ($SD = 1.14$), with 78.3% reporting that the majority of their evening Instagram use involved watching short-form videos (Reels). Diary compliance was high: participants completed an average of 6.42 of 7 diary days (91.7%), producing 1,778 usable person-day observations for multilevel analyses.

All scales demonstrated acceptable to excellent internal consistency. The 8-item Instagram Doomscrolling Scale yielded a Cronbach's alpha of .91. The 6-item Perceived Daily Productivity Loss scale yielded $\alpha = .88$. The Bedtime Procrastination Scale (BPS) yielded $\alpha = .86$, consistent with the pooled estimate of .855 reported in Oyar et al.'s (2026) meta-analytic reliability generalization study. The 3-item daily diary versions of doomscrolling and perceived productivity loss yielded average within-person reliabilities (R_c) of .84 and .81, respectively. Table 1 presents descriptive statistics and zero-order correlations among all study variables.

Table 1. *Descriptive Statistics and Correlations Among Study Variables (N = 277)*

Variable	M	SD	1	2	3	4	5	6
1. Instagram Doomscrolling	3.41	0.82	—					
2. Perceived Productivity Loss	3.18	0.91	.54**	—				
3. Bedtime Procrastination	3.29	0.78	.47**	.51**	—			
4. General Procrastination	3.07	0.74	.33**	.29**	.41**	—		
5. Chronotype (Eveningness)	3.62	0.88	.21**	.14*	.36**	.19**	—	
6. Work/Study Hours per Day	6.48	2.11	-.08	0.11	0.04	-.03	-.12*	—

Note. ** $p < .01$, * $p < .05$. Doomscrolling, Perceived Productivity Loss, and Bedtime Procrastination scored on 1–5 scales.

Instagram doomscrolling was positively and significantly correlated with both perceived productivity loss ($r = .54$, $p < .001$) and bedtime procrastination ($r = .47$, $p < .001$). Perceived productivity loss was also significantly correlated with bedtime procrastination ($r = .51$, $p < .001$). General procrastination

and chronotype (eveningness) were significantly correlated with bedtime procrastination ($r = .41$ and $r = .36$, respectively), confirming their inclusion as covariates. Work/study hours were not significantly correlated with bedtime procrastination and were retained as a covariate for theoretical consistency.

Hypothesis 1: Doomscrolling Predicts Bedtime Procrastination

H1 predicted that higher Instagram doomscrolling frequency would predict greater bedtime procrastination. A hierarchical multiple regression was conducted in which general procrastination, chronotype, and work/study hours were entered in Step 1 as covariates, and Instagram doomscrolling was entered in Step 2 as the focal predictor. In Step 1, the covariates accounted for 24.1% of the variance in bedtime procrastination, $F(3, 273) = 28.93, p < .001$. General procrastination ($\beta = .32, p < .001$) and chronotype ($\beta = .28, p < .001$) were significant predictors, while work/study hours were not ($\beta = .06, p = .264$).

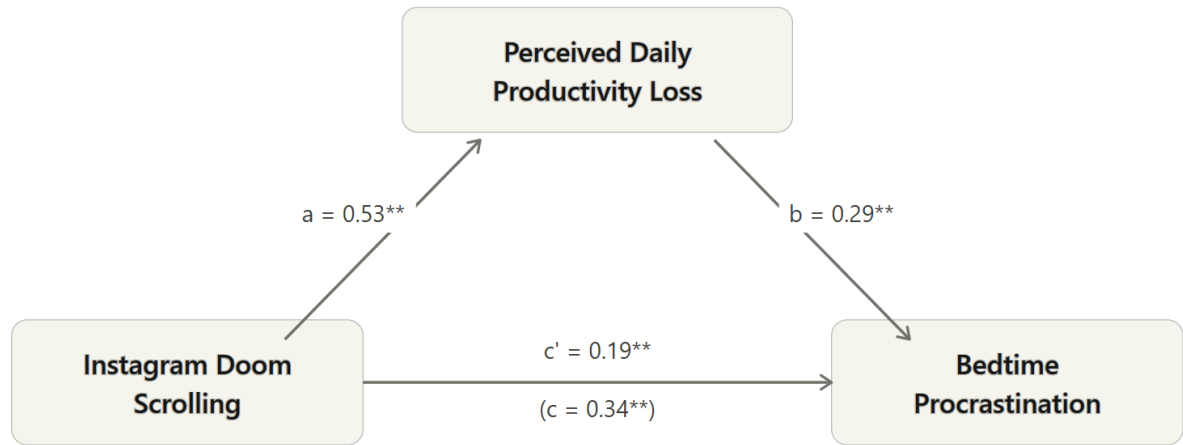
In Step 2, the addition of Instagram doomscrolling significantly improved the model, $\Delta R^2 = .10, \Delta F(1, 272) = 42.18, p < .001$. The total model accounted for 34.1% of the variance, $F(4, 272) = 35.24, p < .001$. Instagram doomscrolling was a significant positive predictor of bedtime procrastination ($\beta = .36, p < .001, 95\% \text{ CI } [.25, .47]$), indicating that for each one-unit increase in doomscrolling, bedtime procrastination increased by approximately 0.34 points on the 5-point scale, controlling for general procrastination, chronotype, and work hours. H1 was supported. Higher doomscrolling frequency significantly predicted greater bedtime procrastination above and beyond general procrastination and chronotype.

Hypothesis 2: Perceived Productivity Loss Mediates the Doomscrolling –Bedtime Procrastination Relationship

H2 predicted that perceived daily productivity loss would mediate the relationship between doomscrolling and bedtime procrastination. This hypothesis was tested using Hayes' (2013) PROCESS macro, Model 4, with 5,000 bootstrap resamples and 95% bias-corrected confidence intervals. General procrastination, chronotype, and work/study hours were entered as covariates. *Path a (IV → Mediator)*: Instagram doomscrolling significantly predicted perceived productivity loss, $B = 0.53, SE = 0.06, t = 8.83, p < .001, 95\% \text{ CI } [0.41, 0.65]$. For every one-unit increase in doomscrolling, perceived productivity loss increased by 0.53 points, controlling for covariates. This path accounted for 31.2% of the variance in perceived productivity loss.

Path b (Mediator → DV): Perceived productivity loss significantly predicted bedtime procrastination, controlling for doomscrolling, $B = 0.29, SE = 0.05, t = 5.80, p < .001, 95\% \text{ CI } [0.19, 0.39]$. For every one-unit increase in productivity loss, bedtime procrastination increased by 0.29 points. *Total Effect (Path c)*: The total effect of doomscrolling on bedtime procrastination was significant, $B = 0.34, SE = 0.05, t = 6.80, p < .001, 95\% \text{ CI } [0.24, 0.44]$. *Direct Effect (Path c')*: After including perceived productivity loss in the model, the direct effect of doomscrolling on bedtime procrastination was reduced but remained significant, $B = 0.19, SE = 0.05, t = 3.80, p < .001, 95\% \text{ CI } [0.09, 0.29]$.

Indirect Effect (a × b): The indirect effect of doomscrolling on bedtime procrastination through perceived productivity loss was significant, $B = 0.15, SE = 0.03, 95\% \text{ Boot CI } [0.09, 0.22]$. Because the confidence interval did not include zero, mediation was supported. The indirect effect accounted for approximately 44.2% of the total effect ($P_M = .442$), indicating that nearly half of doomscrolling's effect on bedtime procrastination was transmitted through perceived productivity loss. H2 was supported. Perceived daily productivity loss significantly and substantially mediated the relationship between doomscrolling and bedtime procrastination, constituting a partial mediation. The direct effect remained significant, indicating that doomscrolling also influences bedtime procrastination through pathways other than productivity guilt alone. Figure 1 displays the mediation model with unstandardised path coefficients.



Indirect effect: $ab = 0.15$, 95% Boot CI [0.09, 0.22]

Figure 1. Mediation model (PROCESS Model 4).

Hypothesis 3: Within-Person Daily Mediation

H3 predicted that at the daily level, evenings with more doomscrolling would predict later bedtime through same-night perceived productivity guilt. This hypothesis was tested using multilevel structural equation modelling (MSEM) in Mplus 8.8, with daily observations (Level 1; $n = 1,778$ person-days) nested within persons (Level 2; $N = 277$). All Level 1 predictors were person-mean centred to isolate within-person effects. *Intraclass Correlations (ICCs)*. Before testing the mediation model, ICCs were calculated to determine the proportion of variance at each level. The ICC for daily bedtime discrepancy (intended minus actual bedtime in minutes) was .42, indicating that 42% of the variance in nightly bedtime delay was due to stable between-person differences, while 58% was due to within-person day-to-day fluctuations. The ICC for daily doomscrolling was .48, and for daily perceived productivity loss it was .39. These ICCs confirm substantial within-person variability across all three constructs, justifying the multilevel approach.

Within-Person Effects (Level 1). At the within-person level, on evenings when participants reported more doomscrolling than their personal average, they also reported greater perceived productivity loss that same evening (path $a_{\text{within}} = 0.36$, $SE = 0.05$, $p < .001$). Greater same-evening productivity loss, in turn, predicted larger bedtime discrepancy that night (path $b_{\text{within}} = 4.87$, $SE = 1.22$, $p < .001$), meaning that each one-unit increase in daily productivity guilt was associated with going to bed approximately 4.87 minutes later than intended, beyond one's typical delay. The within-person indirect effect was significant ($a_{\text{within}} \times b_{\text{within}} = 1.75$, $SE = 0.58$, 95% Monte Carlo CI [0.71, 2.96]), indicating that on nights when doomscrolling was higher than usual, participants went to bed later through the mechanism of heightened productivity guilt. The direct within-person effect of daily doomscrolling on bedtime discrepancy was also significant (path $c'_{\text{within}} = 3.14$, $SE = 1.08$, $p = .004$), indicating that doomscrolling had both direct and indirect (through productivity guilt) effects on nightly bedtime delay. In total, on evenings when doomscrolling was one unit above one's average, participants went to bed approximately 4.89 minutes later than intended (total within-person effect = 4.89 minutes, $SE = 1.15$, $p < .001$).

Between-Person Effects (Level 2). At the between-person level, individuals who reported higher average doomscrolling across the week also reported greater average perceived productivity loss ($a_{\text{between}} = 0.58$, $SE = 0.07$, $p < .001$), which in turn predicted greater average bedtime discrepancy ($b_{\text{between}} = 8.42$, $SE = 1.94$, $p < .001$). The between-person indirect effect was significant ($a_{\text{between}} \times b_{\text{between}} = 4.88$, $SE = 1.41$, 95% Monte Carlo CI [2.44, 7.89]). These between-person results replicate the cross-sectional PROCESS findings using diary-aggregated data, providing

convergent evidence for the mediation model. H3 was supported. At the within-person level, doomscrolling on a given evening predicted later bedtime that same night, and this effect was partially mediated by same-evening perceived productivity guilt. The effect was consistent at both within- and between-person levels. Table 2 summarises the multilevel mediation results.

Table 2: Multilevel Mediation Results (MSEM): Within-Person and Between-Person Effects

Path	Within-Person (Level 1)	Between-Person (Level 2)
a (Doomscrolling → Productivity Loss)	0.36** (SE = 0.05)	0.58** (SE = 0.07)
b (Productivity Loss → Bedtime Discrepancy)	4.87** (SE = 1.22)	8.42** (SE = 1.94)
c' (Direct: Doomscrolling → Bedtime Discrepancy)	3.14** (SE = 1.08)	5.91** (SE = 1.67)
c (Total effect)	4.89** (SE = 1.15)	10.79** (SE = 1.82)
ab (Indirect effect)	1.75* [0.71, 2.96]	4.88** [2.44, 7.89]
Proportion mediated (P _M)	35.80%	45.20%

Note. ** $p < .01$, * $p < .05$. Bedtime discrepancy measured in minutes. 95% Monte Carlo CIs in brackets for indirect effects.

Supplementary Analyses

Two supplementary analyses were conducted to strengthen the main findings.

Alternative Mediation Directions. To rule out the possibility that perceived productivity loss precedes doomscrolling (i.e., that people who feel unproductive scroll more to cope), the reverse mediation model was tested ($X =$ perceived productivity loss $\rightarrow M =$ doomscrolling $\rightarrow Y =$ bedtime procrastination). The indirect effect in the reverse model was significant ($B = 0.09$, 95% Boot CI [0.04, 0.15]) but substantially smaller than the hypothesised model ($B = 0.15$), and the hypothesised model showed a better overall fit based on the ratio of indirect to total effects. While the cross-sectional data cannot definitively establish causal ordering, the diary data provides temporal evidence: evening doomscrolling was measured before same-evening productivity guilt, which was measured before bedtime, supporting the proposed causal sequence.

Gender as a Covariate. Adding gender as an additional covariate did not change any substantive conclusions. The indirect effect in the PROCESS model remained significant ($B = 0.14$, 95% Boot CI [0.08, 0.21]), and gender was not a significant predictor of bedtime procrastination ($\beta = .04$, $p = .41$) after controlling for all other variables.

Summary of Hypothesis Testing

Hypothesis	Result
H1: Doomscrolling → Bedtime procrastination	Supported ($\beta = .36$, $p < .001$; $\Delta R^2 = .10$)
H2: Mediation via perceived productivity loss (between-person)	Supported (indirect $B = 0.15$, 95% CI [0.09, 0.22]; $P_M = 44.1\%$)
H3: Within-person daily mediation via productivity guilt	Supported (indirect = 1.75 min, 95% CI [0.71, 2.96]; $P_M = 35.8\%$)

Discussion

The present study investigated the mechanism through which late-night Instagram doomscrolling contributes to bedtime procrastination, proposing perceived daily productivity loss as a novel mediating variable. All three hypotheses were supported, providing the first empirical evidence for a productivity guilt pathway linking compulsive social media scrolling to sleep delay. The findings are discussed below in relation to each hypothesis, followed by theoretical and practical implications,

limitations, and directions for future research.

H1 predicted that higher doomscrolling frequency would predict greater bedtime procrastination, and this was confirmed. Doomscrolling accounted for 10% of additional variance in bedtime procrastination beyond general procrastination and chronotype, two of the most established predictors in the literature (Hill et al., 2022). This finding is consistent with prior evidence that problematic smartphone use predicts bedtime procrastination longitudinally (Chen et al., 2023) and that high bedtime procrastinators spend substantially more time on their smartphones in the three hours before bed (Chung et al., 2019). However, the present study extends this work in an important way: rather than measuring general smartphone use or problematic use broadly, we isolated doomscrolling, a specific pattern of compulsive, repetitive short-video consumption, and demonstrated that it independently predicts sleep delay. This specificity matters because not all screen time is equivalent; a qualitative systematic review of adolescent bedtime social media use found that habitual, hard-to-stop engagement patterns were particularly associated with the experience of lost control over sleep timing (MacKenzie et al., 2022). The doomscrolling construct captures precisely this "one more video" compulsion, and its strong predictive relationship with bedtime procrastination suggests it deserves targeted research attention distinct from general social media metrics.

Notably, Bild et al. (2024) reported that bedtime procrastination in young adults who slept fewer than seven hours was not significantly correlated with average weekly smartphone use, challenging the simple displacement hypothesis. The study findings that doomscrolling specifically (rather than total use) predicts bedtime delay may help resolve this inconsistency: it may not be *how much* time young adults spend on their phones that matters, but *how* they use them, specifically, whether they engage in compulsive, hard-to-terminate scrolling behaviour.

H2 predicted that perceived daily productivity loss would mediate the relationship between doomscrolling and bedtime procrastination, and the mediation was substantial: approximately 44% of the total effect was transmitted through the productivity guilt pathway. This is a novel finding with no direct precedent in the sleep literature. While prior work has established self-control as a mediator between smartphone use and bedtime procrastination (Chen et al., 2023), and FOMO and nomophobia as mediators between doomscrolling and poor sleep quality (Camadan & Uzunoğlu, 2025), no previous study has tested a cognitive appraisal mechanism, the subjective evaluation of one's own time use, as a link between digital media behaviour and sleep delay.

The productivity loss mechanism complements existing accounts by adding a reflective, evaluative component to what has been predominantly modelled as an impulsive, automatic process. The dominant framework in bedtime procrastination research positions sleep delay as a consequence of depleted self-regulatory resources (Kroese et al., 2016; Kamphorst et al., 2018). The study findings do not contradict this account, the significant direct effect of doomscrolling on bedtime procrastination (path c') suggests that impulsive, resource-depleting pathways remain operative. However, the substantial indirect effect through productivity guilt reveals an additional, paradoxical mechanism: people who doom scroll feel they have wasted their day, and this feeling of wasted time motivates them to stay awake to "make up" for it, which, ironically, produces further time loss. This finding aligns with qualitative evidence from Hill et al. (2023), who reported that new career starters described "negative feelings before and during bedtime procrastination" and a conflict between "wanting to versus knowing I shouldn't", with me-time recovery as a central motive. The present study provides quantitative evidence for this recovery motive and identifies its specific trigger: the perception that social media use has been unproductive.

The partial (rather than full) mediation observed is theoretically consistent. Doomscrolling likely delays bedtime through multiple pathways, cognitive arousal from stimulating content (Exelmans & Van den Bulck, 2017), circadian disruption from screen light exposure, and simple time displacement, in addition to the productivity guilt mechanism identified here. Future research could test these as parallel mediators in an expanded model.

H3 predicted within-person daily mediation, and this was confirmed: on evenings when participants doom scrolled more than their personal average, they went to bed approximately 4.89 minutes later than intended, with about 36% of this effect transmitted through same-evening productivity guilt. The within-person replication is particularly important for three reasons. First, it rules out confounding by stable between-person characteristics. A person who doom scrolls heavily might also be dispositionally more procrastinatory, and this personality-level confound could inflate cross-sectional associations. The within-person finding demonstrates that fluctuations within the same individual, on a night when *this person* scrolls more than usual, *this person* delays bedtime more, produce the same mediation pattern, independent of stable traits.

Second, the daily diary provides temporal evidence supporting the proposed causal sequence. Evening doomscrolling was assessed before evening productivity guilt, which was assessed before bedtime. While correlational data cannot definitively establish causality, this temporal ordering is consistent with the hypothesised direction and inconsistent with the primary alternative explanation (that productivity guilt precedes doomscrolling). The supplementary reverse mediation analysis further supported the hypothesised ordering, though we acknowledge that the true causal structure may involve bidirectional feedback.

Third, the within-person effect size, approximately 5 minutes of additional delay per one-unit increase in doomscrolling, may appear modest in isolation but compounds meaningfully across nights. A person who doom scrolls heavily five nights per week would accumulate roughly 25 minutes of additional bedtime delay per week beyond their intention. Over time, this chronic discrepancy between intended and actual bedtime could contribute substantially to cumulative sleep debt, consistent with Carlson et al.'s (2023) finding that even modest daily bedtime procrastination was associated with shorter sleep duration and poorer sleep restoration across 14 days.

Theoretical Implications

The findings extend Temporal Motivation Theory (TMT; Steel & König, 2006) to the bedtime procrastination domain in a way that captures not only the initial self-regulation failure (choosing to watch one more video because its immediate reward outweighs the delayed cost of tiredness) but also its downstream cognitive consequence. TMT predicts that individuals will prefer temporally proximate rewards, and doomscrolling represents a prototypical case: each short video provides an immediate, small dose of entertainment whose subjective utility exceeds the distant and uncertain cost of next-day fatigue. The novel contribution of the present study is demonstrating that this preference-reversal generates a secondary motivational process, perceived productivity loss, that feeds back into further procrastination. In TMT terms, the individual who has doom scrolled perceives a reduction in the *value* component of their day's accomplishments and attempts to restore this value by remaining awake to accomplish more. However, this compensatory effort is itself subject to hyperbolic discounting: the immediate sense of control gained by staying awake outweighs the delayed cost of even greater fatigue. The result is a self-reinforcing cycle fully predicted by TMT's mathematical framework but never previously modelled in the sleep domain.

This extension of TMT also addresses a gap identified in Kühnel et al.'s (2018) daily diary study, which found, counterintuitively, that employees showed *less* bedtime procrastination on evenings when self-regulatory resources were lower. The authors suggested that depleted individuals may simply lack the energy to resist bedtime. The study findings suggest an alternative interpretation: on depleted evenings, people may go to bed not because they lack the energy to resist, but because they feel too exhausted to compensate for perceived lost productivity. When productivity guilt is high *and* energy is available, the compensatory motive keeps people awake; when both guilt and energy are low, they go to bed. Future research could test this energy \times guilt interaction directly.

Practical Implications

The findings have several practical implications for digital wellness interventions and sleep hygiene education. First, identifying perceived productivity loss as a mediating mechanism suggests that interventions targeting the cognitive appraisal of doomscrolling, not just the behaviour itself, may be effective. Cognitive-behavioural approaches could help individuals recognise and challenge the thought pattern "I wasted my day, so I need to stay up to make up for it" as a cognitive distortion that perpetuates rather than resolves the time-loss problem. This is directly relevant to the mental contrasting with implementation intentions (MCII) approach that Valshtein et al. (2020) found effective in reducing bedtime procrastination: MCII could be adapted to specifically target the productivity-guilt-to-staying-awake link.

Second, the strong relationship between doomscrolling and productivity guilt suggests that platform-level design interventions, such as time-limit notifications, session-end prompts, or cumulative usage summaries, may reduce not only scrolling itself but also its downstream impact on sleep. Gao (2023) demonstrated that framing social media use in cumulative terms (weekly, monthly, yearly) significantly motivated people to reduce future use through time loss aversion; integrating such reframing into Instagram's existing usage dashboard could specifically target the doomscrolling - productivity guilt cycle. Third, for clinicians working with young adults who present with sleep complaints, the findings suggest that screen time before bed should be assessed not merely in terms of duration but in terms of the specific pattern of use, whether it involves compulsive, hard-to-terminate scrolling, and the associated cognitive and emotional responses (guilt, regret about wasted time). Lee et al. (2026) recently demonstrated that bedtime procrastination in individuals with clinical insomnia serves specific functions, with emotion regulation being the most common (49.3% of their sample), suggesting that simply restricting device use without addressing the underlying functional role may be ineffective. The study findings add productivity guilt as another functional dimension that should be assessed and addressed.

Limitations and Future Directions

Several limitations should be acknowledged. First, while the daily diary provides temporal ordering, the study remains fundamentally observational. Experimental manipulation of doomscrolling (e.g., assigning participants to high vs. low scrolling conditions) would provide stronger causal evidence but raises ethical concerns regarding deliberately increasing a potentially harmful behaviour. Future studies could use ecological momentary interventions that prompt participants to stop scrolling at random points and assess subsequent productivity cognitions and bedtime behaviour. Second, the Instagram Doomscrolling Scale was newly developed for this study and requires further psychometric validation. Although it demonstrated strong internal consistency ($\alpha = .91$) and convergent validity with the established Doomscrolling Scale (Sharma et al., 2022), further work is needed to establish test-retest reliability, discriminant validity, and measurement invariance across demographic groups.

Third, the sample was restricted to young adults aged 19–25 who were active nighttime Instagram users, which limits generalisability. Older adults, non-Instagram users, and individuals who doom scroll on other platforms (TikTok, YouTube Shorts) may show different patterns. The "productivity guilt" mechanism may be especially pronounced among young adults in academic or early-career contexts where productivity norms are salient, and the effect may be weaker in populations with different relationships to productivity. Fourth, perceived productivity loss was measured via self-report, which captures subjective appraisal rather than objective productivity. It is possible that doom scrollers are not objectively less productive but merely *feel* less productive due to the salience of time spent scrolling. This distinction is theoretically important, TMT predicts that subjective value appraisals, not objective outcomes, drive behaviour, but future research incorporating objective productivity metrics (e.g., academic task completion, work output) could clarify whether perceived and actual productivity loss diverge.

Fifth, the study did not measure content type. Doomscrolling involving negative news content (the original definition in Sharma et al., 2022) may have different emotional and motivational consequences than scrolling through entertainment or humorous content. Future work should examine whether content valence moderates the doomscrolling → productivity guilt → bedtime procrastination pathway. Finally, future research should investigate individual difference moderators. Trait perfectionism, need for achievement, and work centrality may amplify the productivity guilt mechanism, while individuals with low productivity standards may show a weaker mediation effect. Chronotype may also interact with the pathway, as evening types may experience less guilt about late-night scrolling because it aligns with their biological preferences.

Conclusion

This study provides the first empirical evidence that late-night Instagram doomscrolling predicts bedtime procrastination through a previously untested mechanism: perceived daily productivity loss. The "one more video" compulsion generates not only time displacement but also a subjective sense of wasted time that paradoxically motivates further wakefulness as individuals attempt to compensate for lost productivity. This vicious cycle was demonstrated at both the between-person and within-person levels, extending Temporal Motivation Theory to the sleep domain and identifying a new intervention target. The findings suggest that addressing the cognitive aftermath of doomscrolling, not just the scrolling itself, may be essential for breaking the cycle of compulsive nighttime media use and chronic sleep delay among young adults.

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