

Morning Smartphone Use, Student Attention, And Study Engagement: A Pilot Survey and The Morning Dopamine Priming Model

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Abstract—Most students reach for their phones within minutes of waking, yet the academic consequences of this first contact are rarely examined as a distinct behaviour. This study proposes the Morning Dopamine Priming Model (MDPM), a conceptual framework that treats the first phone check of the day as a possible starting point for a chain of reward anticipation, attentional carry-over, and weaker engagement with study tasks. Drawing on established work on dopamine and reward prediction, incentive salience, notification-related distraction, and attention residue, the model sets out four stages and four testable propositions. To check whether the framework is plausible in a real student setting, a small exploratory survey of 50 undergraduate, postgraduate, and other young adult respondents was analysed descriptively. In this sample, 54% reached for their phone within 30 minutes of waking, 56% looked first at social media, messages, or email, 44% received notifications frequently or constantly while studying, 41% reported an urge to switch away while studying, and 44% reported losing interest quickly in long academic texts. Difficulty refocusing was reported by 57% of heavy users (4+ hours daily) against 26% of lighter users. The data are self-reported, cross-sectional, and drawn from a small convenience sample, so they illustrate rather than test the model. The paper concludes with limitations and a proposed agenda for longitudinal and experimental work.

Index Terms—smartphone use, dopamine, incentive salience, attention residue, student engagement, conceptual framework

I. INTRODUCTION

For a large share of students, the phone is the first object touched after the alarm goes off. What happens next is usually treated as a matter of personal habit, but

it may matter more than it appears. The first minutes of the day are unstructured, and whatever occupies them sets the starting conditions for the following hours. If those minutes are filled with rapidly changing social content, the student arrives at the desk having already spent part of the day's attention on something that is designed to be checked again.

Research on smartphones and cognition has mostly focused on use during a task, such as texting while studying or being interrupted by an alert. Much less attention has been given to what happens before the task begins. This paper argues that early-morning use deserves separate treatment and offers a conceptual framework, the Morning Dopamine Priming Model, to organize the idea. The word priming is used in a loose, descriptive sense: early exposure that changes how strongly later cues pull on attention.

This paper has three aims. First, it lays out the model and the reasoning behind each stage. Second, it states propositions that future studies can test. Third, it shows, using a small survey of students and young adults, whether the behaviours the model relies on actually appear in a student population. The survey is not designed to confirm the model, and the paper makes no causal claim.

II. THEORETICAL BACKGROUND

A. Dopamine, reward prediction and incentive salience

A foundational finding in behavioural neuroscience is that midbrain dopamine neurons respond most strongly to unexpected rewards and then shift their response to cues that predict a reward, which has been interpreted as a signal of prediction error [1]. Applied

loosely to everyday technology, a phone screen delivers cues (a badge, a banner, or a feed) that predict possible social rewards but do not guarantee them. Uncertainty about what will be found is part of what makes checking worth repeating.

Berridge and Robinson argued that dopamine is better understood as driving the motivational "wanting" of a reward, which they call incentive salience, than the pleasure of receiving it. This distinction matters for the present model because it separates the urge to check from the enjoyment of what is found. A student may feel pulled towards the phone without finding the content satisfying, and that pull is the component the MDPM is concerned with. It should be stressed that dopamine was not measured in this study; the term is used for the theoretical mechanism that motivates the framework.

B. Notifications, mere presence and divided attention
Stothart, Mitchum and Yehnert found that simply receiving a phone notification, without the participant touching the device, was enough to reduce performance on an attention task to a degree comparable to actually using the phone. Ward, Duke, Gneezy and Bos reported that the mere presence of one's own smartphone lowered available cognitive

capacity, even when the device was silent and face down, and the effect was larger for people who depended more heavily on their phones [5]. Together, these studies suggest that a phone can draw on attention without being used, which is consistent with the idea of an elevated baseline pull.

C. Attention residue and the cost of switching

Leroy showed that when people move from one task to another, part of their attention remains with the earlier task, a state she called attention residue, and that performance on the new task suffers, especially when the earlier task is left unfinished. A phone check that begins a feed and is never completed is a clear example of an unfinished task that is not completed. If the check occurs just before studying, residue from it may follow the student to the desk [2].

III. THE MORNING DOPAMINE PRIMING MODEL

The MDPM links the four stages (Figure 1). It is a proposed sequence of tendencies, not a deterministic pathway, and each link is expected to vary across the individuals.

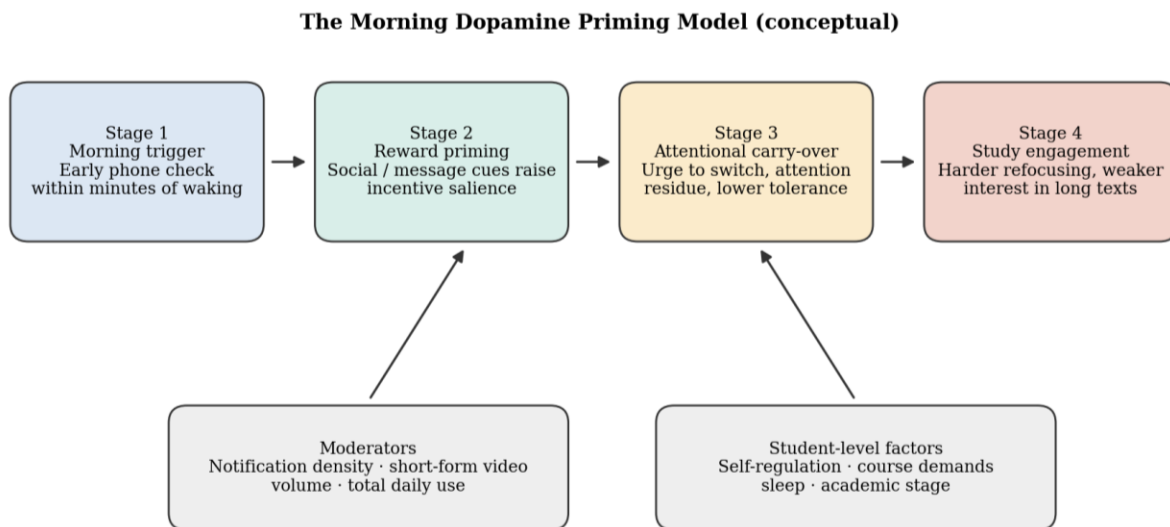


Figure 1. The Morning Dopamine Priming Model: stages, moderators, and student-level factors.

- Stage 1: Morning trigger. As soon as they wake up, students look at their phones. The shorter the delay, and the more social the content, the more strongly we assume this stage is.
- Stage 2: Reward priming. Social, message-based, and short-form content supplies variable, cue-rich input. In line with the incentive-salience account, this is expected to raise the pull of further checking more than it raises satisfaction.

- Stage 3: Attentional carryover. The raised pull persists into the study period as an urge to switch and as attention residue from half-finished browsing, which lowers tolerance for slow, effortful material.
- Stage 4, study engagement. The outcome was more difficulty refocusing after interruptions and weaker sustained interest in long academic texts.

Two groups of variables are expected to shape the pathway. Environmental moderators include notification density, the volume of short-form video watched, and total daily use. Student-level factors include self-regulation, course demands, sleep, and academic stage.

From this, four propositions follow:

- Exposure to Morning Cues: Students who use their phones early in the morning, especially those who are more likely to initially use them to access social media and messaging sites, will experience a much stronger task-switching urge during their study times.
- Environmental Interruptions: A higher rate of incoming interruptions while studying will modify and amplify the morning cues effect, resulting in an even greater need to use the phone.
- Downstream Cognitive Impairments: The stronger task-switching urge will directly be linked to the increased self-reported difficulty of returning focus after interruptions and reduced engagement with long academic readings.
- Behavioural Dosage Moderation: A higher amount of time spent using the smartphone on a daily basis and a greater exposure to short videos will serve as overall moderators of the entire cascade of effects described above.

IV. METHOD

A. Design and participants

An exploratory cross-sectional survey was conducted among 50 students and young adults. Of these, 22 (44%) were undergraduates, 23 (46%) were postgraduates, and 5 (10%) reported another education level (Figure 2a). Participants were reached by convenience sampling; therefore, the sample cannot be considered representative of any wider population.

B. Instrument and analysis

A structured questionnaire collected closed-ended data on daily smartphone use, time to first check after waking, the first activity on the phone, notification load while studying, the usual response to a notification, and daily short-form video time.

Four statements on focus and engagement were rated on a five-point agreement scale from strongly disagree to strongly agree.

One respondent did not answer the item on the urge to switch, so that item has $n = 49$. Responses were analysed descriptively using counts and percentages. In the agreement items, "agree" combines the agree and strongly agree categories.

The comparison between heavy users (four or more hours daily) and lighter users (under 4 hours) is exploratory, and no inferential tests were applied given the sample size.

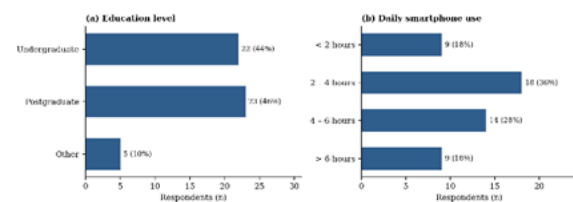


Figure 2. Sample profile: (a) education level and (b) daily smartphone use (N = 50).

V. RESULTS.

A. Overall use

Nearly half of the respondents (46%) used their phones for four or more hours a day, including 18% who reported more than six hours (Figure 2b). A further 36% reported two to four hours, and 18% reported less than two hours.

B. Morning behaviour (Stage 1)

Early checking was common. Thirty percent of respondents checked their phones within five minutes of waking, and another 24% did so within five to thirty minutes, so 54% in total checked within half an hour. Only 16% waited longer than an hour (Figure 3a). The content of that first check was mostly social: 56% opened social media, messages, or email first, compared with 16% who looked at alarms or the calendar, 14% who opened news or weather, and 14% who did not check at all (Figure 3b).

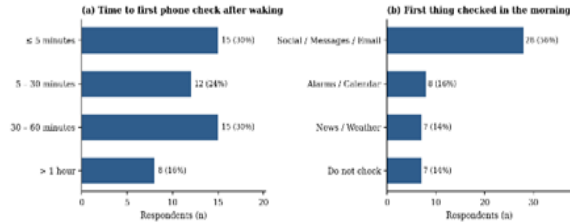


Figure 3. Early morning behaviour: (a) time to first phone check after waking and (b) first thing checked (N = 50).

C. Notifications during study (Stage 2 to 3)

Percent of respondents received notifications frequently (32%) or constantly (12%), while 46% received them occasionally, and 10% rarely or never (Figure 4a). Responses to these notifications showed little restraint. Twenty-eight percent checked immediately, and 38% finished their thoughts first, which means that two-thirds acted on the notification before a natural break. Only 18% waited for a study break, and 16% ignored or silenced notifications (Figure 4b).

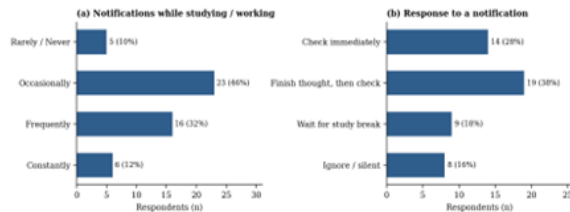


Figure 4. Notifications while studying: (a) frequency and (b) usual response (N = 50).

D. Short-form content and usage groups

Short-form video was a substantial part of daily use. 36% watched for 1–2 hours a day, and 20% watched for more than 2 hours; therefore, 56% watched for over an hour (Figure 5a). Difficulty in refocusing differed by usage group: approximately 57% of heavy users reported it, compared with approximately 26% of light users (Figure 5b). Because these figures come from group percentages, they correspond to roughly 13 of 23 heavy users and 7 of 27 light users, and the gap is offered as a pattern worth testing and not as a confirmed effect.

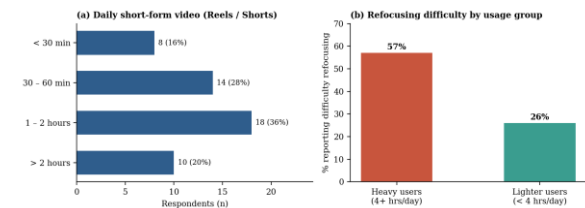


Figure 5. (a) Daily short-form video time and (b) share reporting difficulty refocusing by usage group.

E. Agreement with focus and engagement statements (Stage 3 to 4)

Responses to the four statements are shown in Figure 6. 40% agreed that it is hard to regain focus after a notification, while 26% disagreed and 34% were neutral. 41% agreed that they feel an urge to swipe or switch while studying, and 44% agreed that they lose interest quickly in long academic texts. The statement that checking the phone on waking makes the student less proactive received the weakest support: 30% agreed, 42% disagreed, and 28% were neutral.

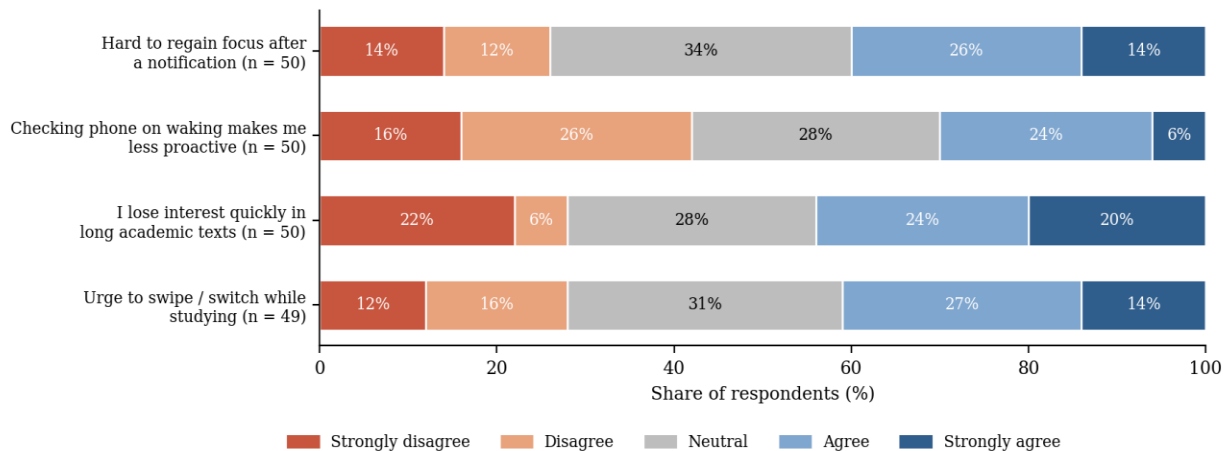


Figure 6. Agreement with statements on focus and engagement (share of respondents).

TABLE II. KEY INDICATORS WITH WILSON
95% CONFIDENCE INTERVALS

Indicator	% of Sample	Model Stage
Use phone 4+ hours per day	46%	Moderator
Check phone within 30 min of waking	54%	Stage 1
First check is social / messages / email	56%	Stage 1 to 2
Notifications frequent or constant while studying	44%	Moderator
Check a notification immediately	28%	Stage 3
Short-form video over 1 hour daily	56%	Moderator
Agree: urge to switch while studying (n = 49)	41%	Stage 3
Agree: hard to regain focus after a notification	40%	Stage 4
Agree: lose interest in long academic texts	44%	Stage 4
Indicator	% of Sample	Model Stage

VI. DISCUSSION

The survey does not test the MDPM, but it shows that the behaviours on which the model rests are present in this student sample. The first stage is well supported at the descriptive level: more than half of the respondents checked their phones within half an hour of waking, and the first check was most often social. If incentive-salience accounts are applied to everyday media, this is the kind of cue-rich exposure the model expects to be most potent [1].

The notification findings are consistent with earlier experimental work. Since notifications alone can reduce attentional performance [4], the fact that 44% of respondents received them frequently or constantly while studying is relevant, and so is the finding that few people silenced them. The tendency of 38% to "finish the thought" before checking is interesting in light of attention residue: delaying a response by a few seconds does not remove the interruption, and the unfinished thought may itself be a source of residue. The presence of the phone on the desk may add a further, quieter cost [5].

The most suggestive pattern is the difference between heavy and light users in terms of refocusing difficulty. This fits Behavioural Dosage Moderation, which predicts that total use intensifies the pathway, but it could equally mean that students who struggle to concentrate turn to their phones more. Cross-sectional data cannot separate these explanations.

The weakest result is also noteworthy. Only 30% agreed that checking their phone upon waking made them less proactive, and more disagreed than agreed. There are at least two readings available. Students may not perceive a morning effect even if one exists, because priming of this kind would be hard to notice from the inside. Alternatively, the morning link may be weaker than the model assumes, with study-time notifications and short-form content doing most work. This is why Stage 1 is treated as a hypothesis for testing and not as an established starting point.

VII. LIMITATIONS

- The sample is small (N = 50) and non-random; therefore, the percentages describe these respondents only.
- All data were self-reported and may have been affected by recall errors and social desirability, particularly for time-based estimates of phone use.
- The design is cross-sectional; therefore, no causal or temporal ordering can be established between morning checking and later engagement.
- No neurochemical or physiological measurements were taken. The dopamine element of the model is a theoretical mechanism.
- The focus items were single statements rather than validated scales, and confounders such as sleep, workload, and personality were not controlled.

VIII. CONCLUSION AND FUTURE DIRECTIONS

This study proposed the Morning Dopamine Priming Model as a way of thinking about early-morning smartphone use as a possible entry point to reduced study engagement. Grounded in work on reward prediction, incentive salience, notification distraction, and attention residue, the model offers four stages and four propositions. A small descriptive survey showed that early, socially oriented phone checking, heavy notification exposure, high short-form video use, and

self-reported difficulty with focus are all common in a student sample, and that difficulty refocusing was more frequent among heavier users.

The next steps are clear. Diary or experience-sampling studies can record the timing and content of the first check each day alongside later study quality. Experiments could delay the first check, or replace social content with neutral content, and measure sustained attention afterwards. Validated scales for attention and engagement, a larger and more varied sample, and statistical control of sleep and workload would allow Exposure to Morning Cues to Behavioural Dosage Moderation to be tested properly. Until then, the MDPM should be read as a structured set of questions about how the first minutes of the day relate to the quality of the hours that follow.

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