Cognitive Overload and News Consumption: Measuring Attentional Depletion in the Digital Information Environment

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Abstract

The proliferation of digital news platforms, social media feeds, push notifications, and 24-hour news cycles has created an unprecedented information environment that systematically challenges human cognitive capacity. This paper provides a comprehensive examination of cognitive overload as a measurable psychological phenomenon in digital news consumption, synthesizing theoretical frameworks, empirical evidence, and psychometric approaches to attentional depletion measurement. Grounded in Cognitive Load Theory (Sweller, 1988), Lang's Limited Capacity Model of Motivated Mediated Message Processing (LC4MP; 2000, 2006), and Information Overload Theory (Eppler & Mengis, 2004), the paper demonstrates that the digital news environment creates systematic intrinsic overload through information complexity and volume, extraneous overload through suboptimal presentation design, and attentional competition through multi-platform simultaneity. A meta-analytic summary of LC4MP research (142 articles, 683 effects) reveals pooled effect sizes of r = .314–.398 across cognitive load and memory domains, establishing the empirical magnitude of media-induced

cognitive limitation. The paper documents the "doomscrolling" phenomenon—compulsive threat-monitoring news consumption—as a behavioral manifestation of anxious cognitive engagement under overload conditions, validated through the Doomscrolling Scale (DSS; Sharma et al., 2022). Validated measurement instruments are evaluated including NASA-TLX, the Cognitive Load Scale (Leppink et al., 2013), and dual-task methodology. Critical literature gaps include the absence of a news-specific cognitive overload scale, insufficient real-time physiological measurement, and inadequate modeling of notification overload effects. The paper proposes a measurement framework integrating self-report scales, physiological indicators (pupillometry, EEG), and behavioral trace data for comprehensive cognitive overload assessment in digital journalism research.

Keywords: cognitive overload; LC4MP; information overload; doomscrolling; attentional depletion; digital news; cognitive load measurement; news avoidance

1. Introduction

The average adult in the digital era is estimated to encounter the informational equivalent of 174 newspapers worth of data every single day (Hilbert & López, 2011). Against this backdrop, the news media landscape has fragmented across dozens of platforms, formats, and delivery modalities—from traditional broadcast schedules to algorithmically curated social media feeds, push notification systems, and continuous 24-hour digital news streams. While this informational abundance (Aarzoo & Lal, 2024) ostensibly serves democratic values of an informed citizenry, it simultaneously imposes substantial cognitive costs that systematically undermine news comprehension, decision quality, and psychological wellbeing.

Cognitive overload—the condition in which incoming information demands exceed available cognitive processing resources—represents one of the most consequential and undertheorized phenomena in contemporary media psychology (Aarzoo & Lal, 2025a). Unlike early information overload research conducted in organizational management contexts (Miller, 1956; Toffler, 1970), media-specific cognitive overload occurs in affectively charged, socially contextualized, and algorithmically amplified environments that introduce unique psychological dynamics. The emergence of "doomscrolling"—the compulsive consumption of negative news despite increasing distress—during the COVID-19 pandemic brought public and

scientific attention to the affective consequences of cognitively overloaded news consumption, yet systematic measurement frameworks lag behind the behavioral phenomenon.

This paper addresses three core objectives. First, it synthesizes the theoretical architecture for understanding cognitive overload in digital news consumption, integrating Cognitive Load Theory (CLT), the Limited Capacity Model of Motivated Mediated Message Processing (LC4MP), and Information Overload Theory within a unified framework. Second, it evaluates existing and proposed psychometric instruments for measuring attentional depletion in news consumption contexts. Third, it proposes a multi-method measurement framework integrating subjective, behavioral, and physiological indicators for comprehensive cognitive overload assessment.

2. Literature Review

The theoretical foundation for cognitive overload in news consumption traces to Miller's (1956) seminal "The Magical Number Seven" establishing that working memory capacity is limited to approximately seven plus-or-minus two chunks of information simultaneously. This absolute cognitive constraint has been elaborated into Cognitive Load Theory (Sweller, 1988, 2011), which identifies three load types: intrinsic load (arising from content element interactivity and complexity), extraneous load (arising from poor instructional or presentational design that doesn't serve learning), and germane load (arising from schema construction activities that benefit long-term knowledge organization). Digital news environments generate all three load types simultaneously: intrinsic load from complex political and scientific content, extraneous load from cluttered interfaces, autoplay videos, and notification interruptions, and demands on germane load from need to integrate new information into existing political and social schemas.

Lang's (2000, 2006) Limited Capacity Model of Motivated Mediated Message Processing (LC4MP) represents the most media-specific cognitive capacity framework. The model proposes that media message processing deploys limited cognitive resources across encoding, storage, and retrieval subprocesses, with both automatic (motivationally driven, e.g., by emotionally arousing content) and controlled (deliberately allocated) resource deployment mechanisms (Aarzoo & Lal, 2025b). A meta-analytic synthesis of LC4MP research (Lang et al., 2020, Annals of the International Communication Association; 142 articles, 683 effects) found pooled effect sizes of r = .314 for encoding-related measures and r = .398 for storage-related measures, establishing LC4MP as empirically robust across media types and contexts.

Information Overload Theory (Eppler & Mengis, 2004) provides an organizational complement to cognitive models, identifying five interrelated antecedent categories: personal characteristics (cognitive capacity, domain knowledge, multitasking ability), information characteristics (quantity, novelty, ambiguity), task demands (time pressure, decision complexity), organizational processes (communication norms, information management), and technology features (notification systems, interface design). In digital news contexts, all five antecedents operate simultaneously—creating what Bawden and Robinson (2009) described as a "perfect storm" of information overload conditions.

The doomscrolling phenomenon represents a behavioral crystallization of cognitive overload dynamics in news consumption. Ytre-Arne and Moe (2021) defined doomscrolling as combining dark news content, monitorial smartphone use, and attention-economy news stream characteristics. A 2024 structural equation modeling study ($N = 443$) found that trait anxiety significantly predicted doomscrolling behavior ($\beta = .29$, $p < .001$) through the serial mediation of intolerance of uncertainty ($\beta = .50$) and perceived information overload, with psychological resilience as a protective moderator ($\beta = –.12$). This mediation model establishes doomscrolling not as mere curiosity-driven news engagement but as anxiety-regulated compulsive monitoring under cognitive overload conditions.

Song, Jung, and Kim (2017, JMCQ) found that perceived news overload leads to cognitive shutdown responses including dismissal of news importance, reduced information-gathering effort, and news avoidance—establishing the paradox that overloaded news environments may produce the least informed audiences despite maximal information supply (Aarzoo & Lal, 2026). Zhang et al. (2022) confirmed in a large-scale study (Frontiers in Psychology) that news overload increases avoidance behaviors that then affect curation and selective information exposure patterns.

3. Theoretical Framework

The integrated theoretical framework proposed here operates across four levels. At the neurological level, working memory capacity constraints (Baddeley, 1986, 2000) establish absolute limits on simultaneous information processing. Baddeley's model distinguishes the central executive (attentional control and coordination), the phonological loop (verbal-acoustic information), the visuospatial sketchpad (visual-spatial information), and the episodic buffer (integration across modalities). Digital news environments simultaneously tax all four subsystems through combined text, audio, video, and notification stimuli.

At the cognitive processing level, LC4MP (Lang, 2000) explains how emotional arousal automatically allocates cognitive resources toward encoding emotionally relevant news content, creating trade-offs between breadth and depth of news processing. When emotionally arousing content (crisis news, outrage-inducing political coverage) triggers automatic resource allocation, controlled processing for information evaluation and fact-checking is correspondingly reduced. This mechanism explains why emotional news frames can both increase engagement and decrease analytical news quality simultaneously.

At the motivational level, Carver and Scheier's (1990) control theory of self-regulation explains doomscrolling through threat-monitoring loops. Neurotic individuals with chronically active threat-monitoring systems are most susceptible to compulsive news checking under uncertainty because their self-regulatory systems maintain sub-threshold threat awareness that motivates continued monitoring despite overload costs. The news environment's consistent supply of threat-relevant information reinforces the checking loop without providing the resolution that would satisfy the monitoring drive.

At the behavioral level, Habit Theory (LaRose, 2010) explains why cognitively overloaded news consumption persists despite negative consequences—platform checking behavior becomes automated through repeated performance, decoupling from conscious cost-benefit evaluation. Breaking cognitive overload habits in news consumption requires both motivational intervention and behavioral habit disruption techniques.

4. Methodology

The recommended measurement framework for cognitive overload in digital news consumption integrates three methodological layers. The subjective measurement layer employs two primary instruments: the Cognitive Load Scale (Leppink et al., 2013; 10 items measuring intrinsic, extraneous, and germane load; validated via PCA and CFA with acceptable factor structure) and the Doomscrolling Scale (DSS; Sharma et al., 2022; 15-item version for comprehensive assessment, 4-item short form for population surveys). The NASA-TLX (Hart & Staveland, 1988; six subscales: mental demand, physical demand, temporal demand, performance, effort, frustration) provides a multidimensional workload benchmark. The Perceived News Overload Scale (proposed adaptation from Schmitt et al., 2018) requires development and validation specifically for news contexts.

The behavioral measurement layer employs dual-task methodology as the objective performance measure: participants complete a primary news reading task while simultaneously

monitoring a secondary task (light detection or tone detection), with secondary task performance degradation indicating primary task cognitive load. This approach avoids self-report bias and provides continuous real-time cognitive load indicators. Additionally, behavioral indicators from digital trace data—rapid scrolling velocity, brief fixation durations, multi-tab switching frequency—serve as ecological validity markers for attentional depletion.

The physiological measurement layer employs three complementary measures. Pupillometry (pupil dilation measured via remote eye-tracker) provides validated real-time cognitive load indicators with millisecond temporal resolution; Van der Wel and van Steenbergen (2018) meta-analytically confirmed pupil dilation reliably tracks working memory load. Frontal midline theta EEG power (4–8 Hz) increases with cognitive load and provides neural validation. Galvanic skin response captures autonomic arousal co-occurring with news-induced cognitive-emotional load.

Minimum sample size recommendation for the multi-method paradigm: N = 200 for laboratory component (well-powered for physiological measurement), N = 1,000 for population survey component. Within-subjects design with counterbalanced news content types (high complexity/high emotional arousal vs. low complexity/low emotional arousal) enables individual difference moderation analysis.

5. Results and Discussion

The synthesized evidence reveals five critical dynamics in cognitive overload during digital news consumption. First, overload is platform-specific: desktop web news consumption generates primarily intrinsic and germane overload through article length and linking complexity; social media news generates extraneous overload through feed clutter, algorithmic non-sequiturs, and notification interruptions; push notification systems create acute attentional disruption that may permanently fragment focused news reading.

Second, the relationship between overload and information quality is paradoxical and nonlinear. Mild cognitive challenge improves processing quality through germane load—engaging existing schemas and building new ones. However, beyond an optimal load threshold, processing quality degrades, comprehension falls, and attitude formation becomes increasingly heuristic-based rather than argument-based. The threshold varies by individual factors including working memory capacity, domain knowledge, and state anxiety.

Third, emotional content modulates overload dynamics through automatic resource allocation. Emotionally arousing news content—crime, disaster, political outrage—triggers

automatic encoding resource allocation via the LC4MP mechanism, simultaneously enhancing recall of the emotional event while reducing analytical evaluation of its context and implications. This creates an "emotional accuracy paradox" in news consumption: the most emotionally engaging content is remembered most vividly but understood least analytically.

Fourth, doomscrolling represents a clinically significant behavioral pattern in a substantial minority of news consumers, with prevalence estimates ranging from 16% (daily doomscrolling in US samples) to 35% during peak crisis events. DSS validation studies establish doomscrolling as a psychometrically distinct construct from general news consumption and from internet addiction, with unique antecedents (trait anxiety, neuroticism) and consequences (increased psychological distress, reduced subjective wellbeing).

Fifth, news avoidance as a response to overload has increased significantly: Reuters Digital News Report (2024) reports 39% of global news audiences actively avoid news sometimes or often, with cognitive fatigue and negative emotional impact as the two most cited reasons. This "disengagement paradox"—overloaded environments producing disengaged audiences—represents a fundamental challenge for democratic communication.

7. Implications

The cognitive overload framework has transformative implications for news industry practice, digital health, and communication policy. For news organizations, applying CLT principles to information design—minimizing extraneous load, managing intrinsic load through scaffolding, and supporting germane load through organizational clarity—can substantially improve comprehension and reduce audience dropout. Specific design recommendations derived from CLT include: progressive disclosure of complex information rather than front-loaded complexity, summary boxes that reduce intrinsic load for general audiences, visual organization that reduces extraneous navigation load, and explicit "reading time" indicators that help readers calibrate attention investment.

For digital health, doomscrolling represents an increasingly recognized clinical concern requiring structured intervention protocols. Cognitive-behavioral frameworks for compulsive news checking—paralleling screen time intervention protocols—should integrate awareness training, anxiety monitoring, and exposure response prevention for worst-case scenario anticipation. The DSS provides a validated clinical screening tool for identifying patients whose news consumption patterns are contributing to anxiety and depression.

For communication policy, attention should be directed toward notification system design regulation. The unrestricted use of push notifications by news applications constitutes an externally imposed attentional cost on audiences that users often cannot effectively manage. Policy frameworks requiring default opt-out notification systems, "cognitive load disclosure" analogous to nutritional labeling, and prohibition of intentionally load-maximizing interface designs deserve serious consideration.

8. Limitations

Five primary limitations should be acknowledged. First, no validated news-specific cognitive load measurement scale currently exists—all instruments reviewed were developed in educational or organizational contexts and applied to media without systematic news-specific validation. Second, the laboratory paradigm cannot fully capture the ecological complexity of real news consumption—the ambient social context, device switching, and interruption patterns of real-world consumption. Third, individual differences in overload susceptibility (working memory capacity, domain knowledge, trait anxiety) are often inadequately controlled in existing studies. Fourth, measurement of news consumption cognitive load through self-report scales shares the general limitation of subjective cognitive load measurement—participants may have poor metacognitive accuracy in assessing their own processing load. Fifth, the field lacks longitudinal data on cumulative cognitive overload effects across news consumption careers.

9. Conclusion

Cognitive overload represents a central psychological challenge of the digital news era with documented consequences for news comprehension, analytical processing quality, audience wellbeing, and democratic engagement. The theoretical integration of CLT, LC4MP, and doomscrolling research within a unified framework, combined with the multi-method measurement approach proposed here, provides both the conceptual architecture and the methodological toolkit for advancing cognitive overload research in digital journalism contexts. The priority research agenda includes: development and validation of a News-Specific Cognitive Load Scale; integration of physiological and behavioral measures in ecologically valid news consumption paradigms; longitudinal modeling of cumulative attentional depletion; and testing of CLT-based information design interventions in real news production contexts. Addressing cognitive overload systematically is not merely an academic

exercise—it is a precondition for news organizations committed to genuinely informing rather than merely engaging their audiences.

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