



Digital Exhaustion and Selective Engagement With Promotional Content: The Roles of Perceived Intrusiveness, Relevance, and Attentional Control

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Abstract

The expansion of digitally mediated consumption has substantially increased the volume and frequency of promotional messages encountered by consumers. Email campaigns, mobile notifications, social-media advertisements, sponsored recommendations, retargeting messages, and platform-based promotional prompts compete continuously for limited cognitive attention. Although increased digital contact provides organizations with additional opportunities to communicate with customers, excessive exposure may contribute to digital exhaustion, attentional depletion, irritation, and increasingly selective responses to promotional content. This study develops a simulation-based framework for examining how digital exhaustion influences consumers' willingness to engage with promotional messages and whether perceived relevance, advertising intrusiveness, and attentional control modify this relationship. A synthetic dataset representing 360 hypothetical digital consumers was constructed across low, moderate, and high digital-exhaustion conditions. Selective engagement was operationalized as intentional attention to, evaluation of, or interaction with promotional content perceived as sufficiently useful or relevant.

The simulated analysis indicates that mean selective-engagement scores decline from 5.82 under low digital exhaustion to 4.63 under moderate exhaustion and 3.21 under high exhaustion. Regression estimates further suggest a substantial negative association between exhaustion and promotional engagement, while perceived relevance and attentional control partially offset this decline. Perceived intrusiveness intensifies disengagement. The findings support an attention-conservation interpretation in which digitally fatigued consumers become less responsive to promotional volume and increasingly dependent on immediate relevance before allocating cognitive resources. The study contributes a responsible digital-marketing perspective by suggesting that increasing promotional frequency may reduce rather than improve communication effectiveness when consumer attention is already saturated. The simulation provides a transparent framework for subsequent validation through field experiments, behavioral analytics, or consumer surveys.

Keywords: digital exhaustion; promotional content; selective engagement; advertising avoidance; perceived intrusiveness; consumer attention; digital marketing; information overload



1. Introduction

Digital marketing has transformed the environment in which consumers encounter commercial communication. Promotional exposure is no longer limited to television, print media, radio, or occasional direct mail. A contemporary consumer may receive promotional emails before beginning the working day, encounter sponsored search results while seeking information, receive mobile-app notifications during routine activities, view targeted advertisements on social networks, encounter retargeted products across websites, and receive platform-specific recommendations based on previous browsing behavior. Each communication may be individually defensible from a marketing perspective, yet their cumulative effect creates a highly competitive attentional environment. The resulting challenge is not simply whether promotional content reaches the consumer but whether the consumer retains sufficient cognitive willingness to notice, interpret, and act upon it. This distinction has become increasingly important because technological capacity to deliver promotional messages has expanded faster than the human capacity to process them.

Consumer attention has always been a scarce resource. Kahneman's capacity model of attention established that individuals possess finite cognitive resources that must be distributed across competing demands. Lang's limited-capacity model similarly emphasizes that information processing depends on the allocation of restricted cognitive resources to encoding, storage, and retrieval. In digitally saturated environments, these constraints become particularly relevant because consumers frequently encounter commercial content while simultaneously performing other activities. Promotional information therefore competes not only with advertisements from other brands but also with interpersonal communication, professional responsibilities, entertainment content, news, social interaction, and platform navigation. When message density exceeds an individual's practical capacity or motivation to process additional stimuli, continued exposure may produce information overload, attentional fatigue, avoidance, or abbreviated decision strategies.

The concept of digital exhaustion extends this reasoning beyond simple exposure frequency. Digital exhaustion refers to a state of perceived cognitive, emotional, or attentional depletion associated with sustained interaction with digitally mediated information environments. Research on social-network fatigue and information and communication technology overload has demonstrated that excessive demands, interruptions, information volume, and social expectations can create feelings of fatigue and withdrawal. Bright, Kleiser, and Grau linked social-media fatigue with the increasing burden associated with intensive platform use, while Lee, Son, and Kim demonstrated relationships among information overload, communication overload, system demands, and social-network fatigue. Although much of this research concerns platform use broadly, similar processes are relevant to promotional communication because marketing messages contribute to the total information environment through which individuals must navigate.

From a marketing perspective, exhaustion does not necessarily imply that consumers reject every commercial message. A more plausible response is selective engagement. Consumers facing limited attentional resources may establish increasingly strict thresholds for deciding which promotional messages deserve attention. A message offering clear relevance, immediate utility, appropriate timing, or recognizable value may still receive consideration, whereas repetitive, intrusive, poorly targeted, or cognitively demanding communication may be ignored. Advertising-avoidance research provides

support for this interpretation. Cho and Cheon demonstrated that perceived goal impediment, advertising clutter, and negative prior experiences contribute to Internet advertising avoidance. Li, Edwards, and Lee identified perceived intrusiveness as an important characteristic of advertising experiences, while Edwards, Li, and Lee showed that forced exposure can generate psychological reactance. These findings indicate that engagement depends not solely on message presence but on how promotional communication interacts with consumer goals and available attention.

2. Objectives of the Study

2.1 To Examine the Relationship Between Digital Exhaustion and Selective Promotional Engagement

The first objective is to examine whether increasing levels of digital exhaustion correspond with systematic changes in consumers' willingness to engage with promotional content. Engagement is not interpreted as passive exposure. Instead, it refers to deliberate attention, message evaluation, click intention, offer consideration, or another purposeful response indicating that a promotional communication has crossed the consumer's threshold for cognitive consideration.

The study distinguishes low, moderate, and high digital-exhaustion conditions. This structure permits examination of whether engagement declines progressively as consumers experience greater informational saturation and attentional depletion. The theoretical expectation is that exhaustion increases the opportunity cost of allocating attention to additional promotional material, thereby making consumers more selective and less responsive to marginal or low-value messages.

2.2 To Evaluate the Influence of Relevance and Perceived Intrusiveness

The second objective is to determine whether the characteristics of promotional communication influence engagement independently of digital exhaustion. Perceived relevance is treated as a positive signal because a message aligned with immediate consumer interests may justify the cognitive effort required for processing. Intrusiveness represents the opposite condition, capturing the degree to which promotional communication interrupts, obstructs, or interferes with an individual's intended digital activity.

These variables are important because digital exhaustion alone cannot explain why a tired consumer may ignore one advertisement while responding to another. The study therefore assumes that engagement results from an interaction between individual attentional condition and message characteristics. Relevant communication may partially compensate for exhaustion, whereas intrusive communication may magnify avoidance.

2.3 To Develop an Attention-Conserving Promotional Communication Framework

The third objective is to develop a responsible marketing framework in which promotional effectiveness is linked to the conservation rather than continuous extraction of consumer attention. Conventional campaign logic can encourage organizations to maximize impressions, frequency, reminders, and cross-channel contact. Such practices may increase immediate exposure while creating cumulative attentional costs that are rarely represented in campaign-level performance indicators.



An attention-conserving framework instead prioritizes relevance, timing, frequency discipline, consumer control, and message economy. The objective is not to eliminate promotional communication but to identify conditions under which marketing remains useful without becoming an additional source of digital burden. Such an approach may support both customer experience and longer-term communication effectiveness.

3. Review of Literature

3.1 Digital Exhaustion, Information Overload, and Limited Attention

The theoretical foundations of digital exhaustion can be traced to research concerning limited cognitive capacity and information overload. Kahneman conceptualized attention as a restricted cognitive resource that must be allocated according to task requirements and individual priorities. Information environments containing competing stimuli therefore create allocation problems because processing one message reduces resources available for another. Lang later applied a limited-capacity perspective to mediated communication, demonstrating that individuals cannot process indefinitely increasing quantities of information with equal depth.

Information-overload research similarly suggests that greater information volume does not produce continuously improving decisions. Jacoby, Speller, and Kohn demonstrated that increases in information can influence consumer decision processes and may eventually impair effective choice. Malhotra subsequently examined information load within consumer decision-making and emphasized that excessive information can reduce decision quality under certain conditions. Eppler and Mengis later reviewed information-overload literature across multiple disciplines and showed that overload results from interactions among information characteristics, personal factors, task requirements, organizational conditions, and technological environments.

Digital environments intensify these pressures because information is persistent, rapidly refreshed, and distributed across multiple channels. Social-network research has documented fatigue as one behavioral consequence of high informational demand. Bright, Kleiser, and Grau found that fatigue can emerge in response to intensive social-media experiences. Lee, Son, and Kim identified information overload, communication overload, and system feature overload as meaningful antecedents of social-network fatigue. These findings are directly relevant to promotional communication because marketing messages occupy the same cognitive environment as socially and professionally important digital information.

3.2 Promotional Intrusiveness, Advertising Avoidance, and Psychological Reactance

Advertising avoidance has been studied extensively as a response to promotional practices perceived as disruptive or unwanted. Speck and Elliott demonstrated that consumers avoid advertising across media and that avoidance is related to characteristics of both the advertising environment and the audience. In Internet environments, Cho and Cheon identified perceived goal impediment, advertising clutter, and negative experiences as important antecedents of advertising avoidance. These findings suggest that consumers do not simply disengage because they dislike commercial persuasion; they may disengage because advertising interferes with their immediate goals.

Intrusiveness provides a particularly useful construct for understanding this process. Li, Edwards, and Lee developed a measure of perceived advertising intrusiveness emphasizing the extent to which advertisements interrupt cognitive processing and interfere with ongoing activity. Edwards, Li, and Lee subsequently examined forced exposure to pop-up advertising and demonstrated that intrusive formats can generate irritation and avoidance through psychological reactance.

Psychological reactance theory, originally developed by Brehm, proposes that individuals become motivated to restore freedom when they perceive that freedom to be threatened. In contemporary digital marketing, excessive notifications, unrequested autoplay content, repetitive retargeting, obstructive promotional overlays, and difficult-to-dismiss advertising can all be interpreted as threats to attentional autonomy. A digitally exhausted consumer may be particularly sensitive because existing cognitive depletion reduces tolerance for additional interruption.

3.3 Relevance, Consumer Engagement, and Selective Attention

Relevance offers an important counterweight to exhaustion and intrusiveness. Consumers allocate limited attention partly according to expected usefulness. Promotional content that corresponds with an active need, recognizable interest, current purchase intention, or meaningful problem may therefore receive attention even within a crowded digital environment. This does not imply that relevance eliminates exhaustion; rather, it increases the expected value of processing a particular message.

Pieters and Wedel demonstrated that advertising characteristics influence visual attention and that consumers allocate attention selectively across brand, pictorial, and textual elements. Their work supports a view of advertising processing as selective rather than automatic. Calder, Malthouse, and Schaedel likewise demonstrated that engagement with online media contexts can influence advertising effectiveness, highlighting that advertising outcomes depend partly on the quality of the broader experience in which advertisements are encountered.

Research on personalized advertising further indicates that relevance can improve communication effectiveness when implemented appropriately. Bleier and Eisenbeiss showed that personalized online advertising effectiveness depends on what is personalized as well as when and where the advertising appears. Aguirre and colleagues demonstrated that personalization can become less effective when the underlying collection of personal information undermines trust. These studies reinforce the importance of distinguishing useful relevance from indiscriminate targeting.

4. Research Methodology

4.1 Research Design and Synthetic Sample

This study adopts a quantitative simulation-based research design. The numerical observations used in the analysis are synthetic and do not represent responses collected from actual human participants. Simulation was selected to demonstrate how the proposed theoretical relationships could be operationalized and statistically examined without presenting fabricated field observations as completed empirical research.

A hypothetical analytical sample of 360 digital consumers was generated. The simulated cases were distributed equally across three digital-exhaustion conditions: low exhaustion, moderate exhaustion, and high exhaustion. Each condition contained 120 observations. The design assumes

consumers who regularly encounter promotional messages through digital channels including email, social networks, retail applications, websites, and mobile notifications.

Table 1: Operational Structure of the Simulation

Construct	Conceptual Meaning	Simulated Measurement	Expected Relationship With Selective Engagement
Digital exhaustion	Cognitive and attentional depletion associated with sustained digital exposure	Seven-point scale	Negative
Promotional intrusiveness	Degree to which advertising interrupts or obstructs ongoing digital activity	Seven-point scale	Negative
Promotional relevance	Perceived usefulness and contextual appropriateness of promotional content	Seven-point scale	Positive
Attentional control	Ability to regulate exposure and intentionally allocate attention	Seven-point scale	Positive
Promotional clutter	Perceived excessive volume or repetition of commercial messages	Seven-point scale	Negative
Selective engagement	Intentional attention to or interaction with promotional messages considered worthwhile	Seven-point scale	Dependent variable

Note: All observations and values are simulated for methodological illustration. No respondents were recruited and no survey was administered.

4.2 Proposed Measurement Instrument

The measurement framework was informed conceptually by established literature concerning information overload, social-network fatigue, advertising intrusiveness, avoidance, and engagement. Because the present study does not involve actual respondents, psychometric properties cannot legitimately be claimed from the simulated dataset as evidence of an empirically validated measurement instrument.

A future empirical study could operationalize the principal relationships using the following five proposed questionnaire statements on a seven-point agreement scale:

- I often feel mentally tired after dealing with a large amount of digital content during the day.

- Promotional messages frequently interrupt what I intend to do online.
- I am more willing to consider promotional content when it is immediately relevant to my current needs.
- I deliberately ignore most promotional messages and pay attention only to those that appear useful.
- When I feel digitally exhausted, I am less willing to engage with promotional content.

These statements are proposed research items and were not administered to actual participants. Before field use, the scale should undergo expert assessment, pilot testing, reliability analysis, convergent and discriminant validity evaluation, and appropriate ethical review. Existing validated scales should be adapted where possible rather than treated as interchangeable with the proposed items.

4.3 Analytical Strategy and Reproducibility

The analysis was conducted in two stages. First, descriptive comparisons were used to examine mean selective-engagement scores across the three digital-exhaustion conditions. This provides an intuitively interpretable representation of how engagement may change as exhaustion increases.

Second, a simulated multiple-regression model was specified:

$$[SE_i = \beta_0 + \beta_1 DE_i + \beta_2 PI_i + \beta_3 PR_i + \beta_4 AC_i + \beta_5 PC_i + \epsilon_i]$$

where (SE) represents selective engagement, (DE) digital exhaustion, (PI) perceived intrusiveness, (PR) promotional relevance, (AC) attentional control, (PC) promotional clutter, and (ϵ) the residual component.

Expected coefficient directions were specified before interpretation. Digital exhaustion, intrusiveness, and clutter were expected to have negative relationships with selective engagement, whereas relevance and attentional control were expected to show positive associations.

The analysis is intended to provide a reproducible conceptual template rather than population-level evidence. Accordingly, statistical values should be interpreted only as characteristics of the simulated scenario. A subsequent empirical study would require real sampling procedures, informed-consent arrangements where applicable, transparent inclusion and exclusion criteria, data-quality controls, preregistered or prospectively specified hypotheses, and appropriate inferential assumptions.

5. Analysis

5.1 Variation in Engagement Across Digital-Exhaustion Conditions

The simulated descriptive results show a progressive decline in willingness to engage with promotional content as digital exhaustion increases. Mean selective engagement was 5.82 under the low-exhaustion condition, declining to 4.63 under moderate exhaustion and 3.21 under high exhaustion.

The difference between the low- and high-exhaustion conditions is 2.61 points on the simulated seven-point scale. The pattern indicates that increasingly exhausted consumers require stronger justification before allocating attention to additional commercial communication. Promotional exposure therefore remains technically possible while meaningful engagement becomes progressively more difficult to obtain.

This distinction has practical importance. Delivery rates, impressions, or notification counts may remain high even when cognitive engagement deteriorates. A marketing system relying exclusively on

exposure metrics could consequently interpret increased message delivery as expanded communication opportunity while consumers simultaneously become less willing to process those messages.

Table 2: Simulated Results for Selective Promotional Engagement

Analytical Indicator	Simulated Value	Direction	Interpretation
Selective engagement: Low exhaustion	5.82	Baseline	High willingness to consider promotional content
Selective engagement: Moderate exhaustion	4.63	↓	Noticeable reduction in engagement
Selective engagement: High exhaustion	3.21	↓↓	Substantial attentional withdrawal
Digital exhaustion coefficient	−0.418	Negative	Higher exhaustion reduces engagement
Promotional intrusiveness coefficient	−0.286	Negative	Interruptive communication increases avoidance
Promotional relevance coefficient	+0.374	Positive	Relevant content preserves attention
Attentional control coefficient	+0.218	Positive	Greater control supports intentional engagement
Promotional clutter coefficient	−0.173	Negative	Excessive message volume weakens engagement
Model (R^2)	0.648	—	Predictors explain substantial synthetic variation

Note: These values were generated for simulation-based analysis and are not estimates derived from actual consumers.

5.2 Relative Influence of Exhaustion, Relevance, and Intrusiveness

Digital exhaustion produced the strongest negative simulated coefficient at approximately −0.418. The result suggests that accumulated attentional fatigue can reduce responsiveness independently of the characteristics of a specific message. This is theoretically important because it implies that organizations compete not only against rival advertisements but against the consumer's existing cognitive workload.

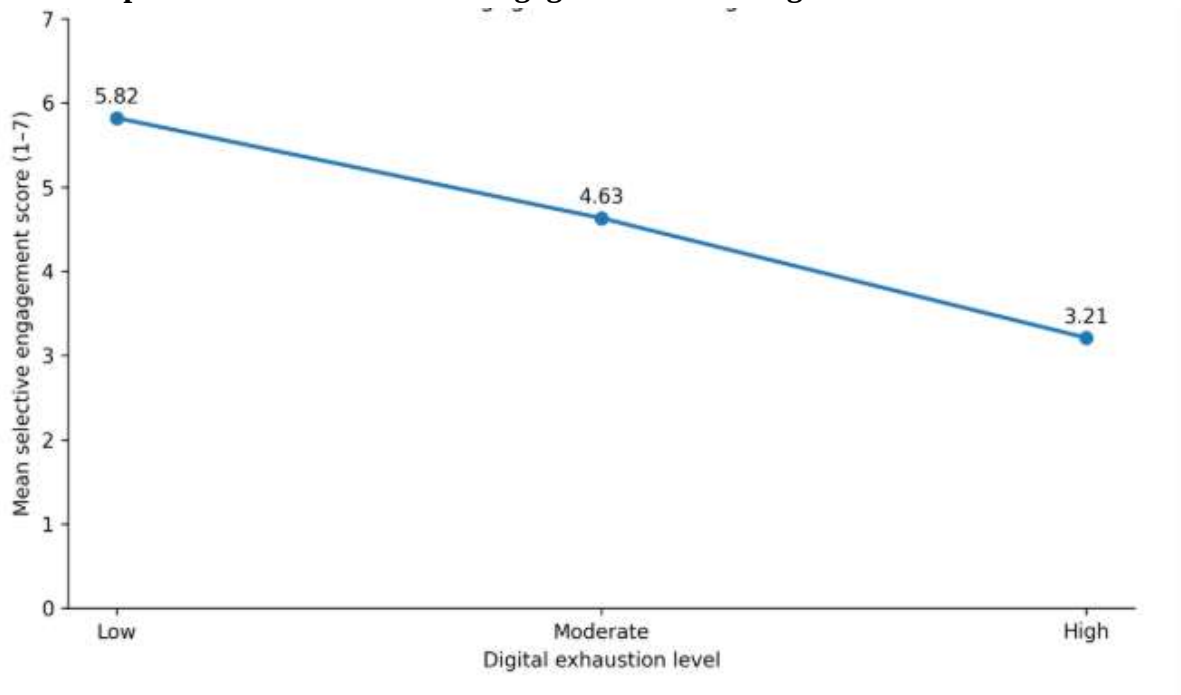
Promotional relevance produced the largest positive coefficient at approximately +0.374. This indicates that relevance can partially preserve engagement even when consumers face substantial digital demands. The result should not be interpreted as justification for unlimited behavioral targeting.

Relevance must be achieved without creating privacy concerns, inappropriate inference, or excessive contact. Its value lies in reducing the consumer's need to process obviously irrelevant material.

Perceived intrusiveness showed a negative coefficient of approximately -0.286 , while promotional clutter produced a smaller but still negative relationship. These results are consistent with the proposition that interruptions become increasingly costly when attentional resources are constrained. Attentional control, by comparison, showed a positive relationship with engagement, suggesting that consumers may be more receptive when they retain agency over the timing and amount of promotional exposure.

5.3 Graphical Pattern of Selective Engagement

Graph 1: Simulated Selective Engagement Across Digital Exhaustion Levels



The downward trajectory illustrates a clear attention-depletion pattern. Engagement declines from 5.82 in the low-exhaustion condition to 4.63 at the moderate level and reaches 3.21 under high exhaustion.

The key finding is not that digitally exhausted consumers become completely unreachable. Rather, exhaustion raises the threshold that promotional communication must cross before attention is allocated. Under low exhaustion, consumers may be willing to explore moderately relevant commercial content. Under high exhaustion, they may reserve attention almost exclusively for communication that appears immediately useful, credible, concise, and appropriately timed.

This pattern supports the concept of attention conservation. Consumers experiencing high digital demand protect remaining cognitive resources by reducing processing of information that does not appear sufficiently valuable. Selective disengagement therefore functions as an adaptive response to excessive informational demand rather than merely an expression of negative attitudes toward advertising.

6. Discussion

6.1 Digital Exhaustion Changes the Economics of Consumer Attention

The simulated findings reinforce the proposition that attention should be treated as a limited customer resource. Traditional digital-marketing systems frequently operate according to an exposure-expansion logic in which additional messages, retargeting opportunities, notifications, and impressions are interpreted as incremental opportunities for conversion. This assumption becomes problematic when the cumulative effects of communication are considered.

A consumer who receives repeated messages may initially provide additional opportunities for measurement but simultaneously experience increasing cognitive costs. As exhaustion develops, each subsequent promotional message must compete against a stronger motivation to conserve attention. The marginal value of additional exposure may therefore decline and can potentially become negative when repetition generates irritation, avoidance, or broader disengagement from a brand.

The result is compatible with limited-capacity theories of information processing and with prior research concerning social-media fatigue and information overload. Marketing effectiveness cannot be separated from the informational environment in which advertising occurs. A message may be well designed in isolation while still performing poorly because it arrives after the consumer's practical attentional capacity has been exhausted.

6.2 Relevance Protects Attention but Does Not Justify Excessive Targeting

The positive simulated association between relevance and engagement demonstrates why appropriately matched promotional communication can remain effective despite digital saturation. Relevance reduces the cost of evaluating a message because consumers can recognize its utility quickly. A timely discount for a product currently under consideration, for example, may justify attention more readily than a generic promotional announcement unrelated to immediate needs.

However, relevance should not be interpreted as an unlimited license for data extraction or behavioral surveillance. Highly personalized promotion can generate negative reactions when consumers perceive that targeting relies on unexpected or intrusive information practices. Research by Aguirre and colleagues demonstrates that personalization effectiveness can be undermined when consumers become uncomfortable with the manner in which information has been collected.

The managerial objective should therefore be useful relevance with informational restraint. Organizations should prioritize contextual relevance, declared customer preferences, recent interactions, and legitimate service relationships rather than attempting to infer every possible characteristic of an individual. The most sophisticated targeting system is not necessarily the most effective if its operation increases discomfort or cognitive pressure.

6.3 From Attention Extraction to Attention-Conserving Marketing

The results support a transition from attention-extractive marketing toward attention-conserving communication. Attention-extractive systems attempt to maximize immediate visibility through frequency, interruption, urgency, and repeated contact. Attention-conserving systems recognize that every unnecessary message consumes part of a finite relationship resource.



An attention-conserving strategy would emphasize frequency caps, meaningful preference controls, channel coordination, concise messages, relevance thresholds, appropriate timing, and suppression of redundant promotional contact. Such mechanisms can reduce the likelihood that multiple automated systems simultaneously target the same consumer without awareness of cumulative exposure.

This approach also requires broader performance measurement. Campaign managers should not evaluate success solely through immediate clicks, impressions, or short-term conversion rates. Unsubscribe behavior, notification disabling, app abandonment, advertising avoidance, declining engagement, frequency sensitivity, and longer-term customer responsiveness can provide signals that communication intensity has exceeded sustainable levels.

Responsible digital marketing therefore involves deciding not only what message should be sent, but also whether another promotional message should be sent at all. In attention-saturated environments, disciplined silence can occasionally produce greater long-term value than another optimized impression.

7. Conclusion

This study developed a simulation-based framework for examining the relationship between digital exhaustion and selective engagement with promotional content. The framework integrates limited-attention theory, information overload, advertising intrusiveness, promotional relevance, attentional control, and advertising avoidance. The simulated findings reveal a clear decline in selective engagement as digital exhaustion rises, with the mean engagement score falling from 5.82 under low exhaustion to 3.21 under high exhaustion.

The analytical model further suggests that digital exhaustion and perceived intrusiveness operate as important barriers to promotional engagement, whereas relevance and attentional control can partially preserve consumer responsiveness. These relationships support an attention-conservation perspective in which consumers allocate increasingly scarce cognitive resources toward information perceived as immediately useful and suppress communication that appears repetitive, irrelevant, or interruptive.

For marketing practice, the findings challenge the assumption that more promotional opportunities necessarily produce more effective communication. Digital systems can make message delivery inexpensive without making consumer attention abundant. Organizations should therefore evaluate the cumulative attentional burden created by their promotional ecosystems and establish governance mechanisms for message frequency, relevance, timing, channel coordination, and consumer control. Such practices can reduce unnecessary communication while protecting the long-term responsiveness of customers.

The study is limited by its intentional reliance on simulated observations. The numerical effect sizes presented here should not be generalized to actual consumers. Future research should validate the model through controlled experiments, longitudinal digital-behavior data, field studies, and representative surveys. Particular attention should be given to variation across consumer age, occupational digital exposure, platform use, product category, message frequency, device type, and individual need for cognition. Experimental work could also determine whether the relationship between exhaustion and engagement becomes nonlinear at very high levels of exposure. Despite these limitations, the framework provides a theoretically grounded foundation for studying promotional

effectiveness as a function not merely of message optimization but of responsible management of scarce consumer attention.

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