Designing for control:

Embedded Digital Interventions to Counter Compulsive Short-Form Video Use

Information System Science

Master's thesis

Author:

Ewald Lafitte

Supervisor:

Dr. Florian Pethig

Second and Third Readers:

Dr. Farhan Ahmad

Prof. Dr. Jocelyn Husser

05.06.2025

Tilburg, the Netherlands

The originality of this thesis has been checked in accordance with the University of Turku quality assurance system using the Turnitin Originality Check service.

Master's thesis

Subject: Digital Addiction and Interface Design
Author: Ewald Lafitte
Title: Designing for Control: Embedded Digital Interventions to Counter Compulsive Short-Form Video Use
Supervisor: Dr. Florian Pethig
Number of pages: 65 pages + appendices, 79 pages
Date: 05.06.2025

Abstract

Short-form video (SFV) platforms like TikTok have become dominant in the digital media landscape, driven by immersive design features such as algorithmic personalization, continuous scroll, and high sensory stimulation. While these features maximize engagement, growing evidence links SFV use to compulsive behavior, impaired attention, and weakened self-regulation. Traditional awareness tools—such as screen time apps—often fail in such environments, as they rely on voluntary self-control despite the platform's intent to suppress it. This thesis investigates whether embedded digital interventions, implemented directly within the consumption flow, can counteract compulsive SFV usage. A between-subjects experiment was conducted using a custom-built SFV platform, testing and comparing two conditions: a friction-based timer and a targeted motivational warning. The study measured behavioral outcomes, perceived control, and future intervention acceptance. Findings show that both intervention types significantly reduced perceived overconsumption and increased user reflection. Tailored warnings were also rated as more supportive, though behavioral outcomes were similar across types. These results suggest that embedded interventions can help restore user agency in digital environments explicitly designed to undermine it, offering practical insights for platform designers and policymakers.

Keywords: Short-form video, Digital interventions, Interface design, Compulsive media use, Behavioral nudges, Friction awareness, Digital well-being

Acknowledgement

This Master's thesis marks the final product of three semesters spent across three countries, representing the completion of the International Master in Management of IT (IMMIT). This program has allowed me to grow both professionally and personally, and I am proud to present the findings of this study, findings that would not have been possible without the support I received.

I would like to sincerely thank Dr. Florian Pethig, who supervised this thesis project. The topic was deeply important to me, as I feel personally impacted by some of the outcomes I present. Initially, I was skeptical about pursuing this path and unsure of the relevance of my trajectory, but you supported me from the very beginning. You guided me throughout this journey, ensuring that I maintained academic rigor every step of the way. Thank you.

I would also like to express my gratitude to the educational teams at IAE Aix-Marseille, the University of Turku, and Tilburg University, who make the IMMIT program possible and contribute every day to its development. Two years ago, I was uncertain about what to pursue after my Bachelor's degree. I was searching for something that could broaden my field of knowledge, coming from a purely business-oriented background, while also providing a real challenge and the opportunity to discover more of life. This program has far exceeded my expectations, equipping me with a diverse set of skills and creating unforgettable memories across Europe, as I adapted each semester to new subjects, academic environments, and climates.

Finally, I would like to thank all the students of Cohort 17, who have become more than friends over the past two years. We have shared so many memories and supported each other through intense periods, even when spread out across Europe. Thank you for making this journey unforgettable.

Table of Contents

LIST OF FIGURES

LIST OF TABLES

1 Introduction

Short-form video (SFV) platforms like TikTok, YouTube *Shorts*, and Instagram *Reels* have rapidly reshaped the digital media landscape, becoming central to user engagement strategies across major platforms. While not intrinsically innovative, this format presents a strategic combination of interface features—short content duration, algorithmic personalization, seamless navigation, and continuous sensory stimulation—that foster intense user immersion (Gu & Zhao, 2024; Bao et al., 2024; Qin et al., 2022).

However, while the structural design of SFV platforms succeeds in maximizing engagement, growing research warns of unintended consequences: compulsive use, impaired attention, and reduced cognitive control (Liu, 2022; Wang & Lee, 2020; Reinecke et al., 2022). These effects are not incidental but stem from the very mechanisms that sustain user immersion. Despite this, digital awareness strategies remain largely external and rely on user self-regulation—an approach misaligned with environments explicitly designed to override it (Carter & Johnson, 2023; Chung & Lee, 2022).

This study addresses that gap by exploring whether embedded digital interventions—warnings placed directly within the usage experience—can help restore user awareness and disrupt addictive behavioral patterns. By empirically testing the effectiveness of different intervention types, this research aims to inform both academic understanding and practical solutions toward more responsible digital use.

1.1 Topic of the Thesis

Short-form video (SFV) refers to digital video content typically lasting under one minute, designed for fast consumption and high engagement. Its genesis can be traced back to the platform Vine in 2013, which introduced six-second looping videos created purely for entertainment (Marone, 2016).

The genre matured rapidly and gained in popularity with the rise of TikTok in 2018 following its merger with Musical.ly (Zeng et al., 2021). Available in over 150 countries and supporting 75 languages (Ma & Hu, 2021), TikTok experienced exponential user growth—from 55 million monthly active users in 2018 to 1.12 billion by the end of 2023 (Backlinko, 2024). Average daily usage also increased, reaching 95 minutes globally. What was once considered a relatively "new" format quickly became the standard for engagement, as the trend spread across major platforms. Instagram launched *Reels* in 2020, Snapchat introduced *Spotlight*, and YouTube debuted *Shorts* in 2021, which now draws over 2 billion monthly users and more than 70 billion daily views (Statista, 2023).

Today, SFV is no longer an add-on—it has become a strategic focus. All major platforms are reconfiguring their algorithms and monetization systems around SFV content. However, this rapid success also raises important concerns. Emerging studies argue that if a format is powerful enough to reshape an entire industry, it is also likely to produce significant effects on user behavior (Dai, Tai, & Ni, 2021). Recent findings confirm this direction: SFV use has been associated with impairments in attention (Chen et al., 2023), increased academic procrastination (Xie et al., 2023), reduced prospective memory (Chiossi et al., 2023), and sleep

disturbances among adolescents (Jiang & Yoo, 2024). Users report compulsive usage patterns resembling behavioral addiction, with features such as craving, loss of control, and emotional regulation through use (Zhu et al., 2024; Yue et al., 2024). These early signs indicate that the format may not only capture attention efficiently but do so at the expense of long-term cognitive and emotional balance.

1.2 Problem Statement

While neither the content nor the platform architecture introduces genuine innovation, it is the combination and concentration of a strategic set of features that has driven such substantial user adoption. This structural design includes short content duration (Gu & Zhao, 2024), high sensory stimulation (Qin et al., 2022), endless scroll (Sim et al., 2024), real-time algorithmic personalization (Bao et al., 2024), and seamless navigation relying on single-finger interaction. These design choices are not cosmetic; they are purposefully integrated to create an immersive and frictionless experience.

By removing decision points and presenting an uninterrupted stream of emotionally charged content, this environment gradually suppresses user reflection and decision-making capacities (Sim et al., 2024; Liu, 2022). To cope with the pace, users shift into a passive mode of consumption, which aligns closely with the platform's ergonomics, often resulting in temporal dissociation. This fosters the initial layer of addictive patterns, which are then reinforced by deeper emotional and psychological mechanisms.

The variability and unpredictability of reward inherent to the personalized content stream create neurological feedback loops akin to those found in slot machines (Wang & Lee, 2020). Because gratification is so easily accessible (Zhang et al., 2019), users become prone to overreliance, eventually developing dependency and falling into habitual reward-seeking behavior (Xu, Phan, & Tan, 2022). At the same time, the platform's structural design impairs cognitive regulation, making disengagement more difficult and further entrenching compulsive use (Reinecke et al., 2022; Liu, 2022).

Yet, despite growing concerns surrounding this format—particularly given its popularity among younger audiences—digital interventions remain limited. Current approaches often rely on promoting digital awareness or screen-time apps, which assume the user's self-regulatory capacity. This creates a critical mismatch, as highlighted by scholars in public health and legal research, who emphasize that in environments engineered to override self-control, responsibility for regulation cannot rest solely on the user (Chung & Lee, 2022; Carter & Johnson, 2023). Similarly, research in marketing and behavioral science has called for greater design accountability, especially where persuasive technologies exploit cognitive and emotional vulnerabilities but remain underregulated (Berthon, Pitt, & Campbell, 2019).

This thesis therefore responds to a multidisciplinary call—across Information Systems, behavioral science, and public health—for the development and empirical testing of embedded digital interventions (Valta & Maier, 2022; Chung & Lee, 2022; Carter & Johnson, 2023; Berthon, Pitt, & Campbell, 2019). The goal is to engage within the very structure of these platforms, acknowledging their impact on self-regulatory functions, and proposing real-time solutions that can disrupt compulsive behavior, restore user reflection, and promote

more intentional digital use. The study seeks to generate concrete evidence on the impact of such interventions in terms of behavior, perception, and user acceptance.

1.3 Research Questions

The main RQ:

To what extent can embedded digital awareness interventions influence compulsive use patterns in short-form video consumption?

To support the main research question above this research divided the RQ into several sub-questions:

- How do users adapt their viewing patterns when presented with real-time information about their consumption?
- How do different types of digital interventions (friction-only vs. behavioral nudges) compare in effectiveness?
- How do embedded warnings influence users' perceived sense of self-regulation during short-form video consumption?

Answering these questions will help clarify the mechanisms through which embedded digital interventions operate in the context of SFV use. This research aims to contribute to existing literature in the fields of Information Systems and digital behavior by offering empirical insights into intervention design and effectiveness. In addition, it may provide practical guidance for designers and policy actors seeking to encourage responsible digital habits.

2 Background Literature

The present literature review aims to establish both a conceptual and empirical foundation for examining the addictive nature of short-form video (SFV) platforms, as well as the potential of embedded digital interventions as a countermeasure. Drawing from fields such as Neuroscience, Psychology, Information System, and Public Health, this section reviews interdisciplinary research to identify both the drivers of compulsive use and emerging solutions that inform the design of this study's intervention.

The first section focuses on understanding digital addiction (DA) in a broader sense, exploring the underlying psychological and neurobiological mechanisms. The second section reviews previous attempts at digital awareness strategies, highlighting why conventional approaches have often proven inadequate. The third section specifically evaluates the SFV format, examining the psychological and cognitive mechanisms it exploits, as well as how these platforms are structurally designed to sustain engagement and encourage compulsive use. Finally, the review considers the societal dimension, addressing the current state of digital addiction regulation, public health concerns, and gaps in the empirical research landscape.

2.1 Digital Addiction

The exponential growth of digital technologies into daily life has been accompanied by increasing academic concern about the development of addictive usage patterns. This section reviews the current state of research on DA, starting with how its definition has evolved to include behavioral patterns beyond traditional substance use. It then explores the psychological and technological mechanisms that sustain compulsive engagement, followed by an overview of the cognitive and health-related consequences associated with overuse. Lastly, it considers emerging evidence of the broader social impact of DA, offering a comprehensive foundation for understanding and addressing the dynamics of compulsive digital behavior.

2.1.1 The Evolving Definition of Digital Addiction

Debate continues over whether we should approach more established addictions (sometimes referred to as substance- or drug-based) differently from behavioral addictions such as gambling, sex, or internet use (Orford, 2001). More recent studies are likely to put both perspectives into the same framework (Grant et al., 2010; Petry, 2006). Indeed, once one plunges into a wide definition of addiction, it is generally accepted as the repeated involvement in a behavior that is known to be harmful (American Psychiatric Association, 2018; Kovac, 2012). Practically, it means when a subject begins an activity in order to find pleasure, which becomes a compulsive and irrational necessity (Orford, 2001). When looking back at this seemingly simple definition, both substance and behavioral addictions seem to be covered. It is not what the end product is, but rather how the user responds to it, namely the loss of control and continued pursuit of a behavior despite how harmful it is (Hyman et al., 2006). In support of this integrative vision, neuroimaging studies have presented convincing physiological evidence. It has been established that behavioral addictions stimulate the same neural circuits,

especially reward processing and motivational salience, as substance addictions (Orford, Daniels, & Somers, 1996). Such findings support the claim that DA should not be regarded as a qualitatively different phenomenon, but rather as an extension of the wider addictive processes that share common neurological substrates. Reflecting this scientific consensus, clinical diagnostic frameworks have started to incorporate behavioral addictions more formally. Notably, the DSM-5 (Diagnostic and Statistical Manual of Mental Disorders) included "Internet Gaming Disorder" as a condition warranting further study (Tao et al., 2010; Van Rooij et al., 2011). In 2018, the World Health Organization (WHO) went further by officially recognizing it as a digital disorder under the ICD-11 classification. According to Berthon et al. (2019), this identification has shed greater light on the continuum of digital behavioral addictions such as problematic smartphone use and compulsive social media use, which now demand adapted policy.

For the present research, this evolving definition of addiction is foundational. It establishes that DA, specifically in the form of compulsive SFV consumption, can and should be analyzed through the same theoretical and clinical lenses historically reserved for substance-based addictions. Understanding this continuity provides an essential prerequisite for investigating the mechanisms that may underlie SFV overuse, and for designing interventions capable of mitigating its potential addictive nature.

2.1.2 Mechanisms Underlying Digital Addiction

Current studies point to a number of factors that contribute to the development and sustained presence of DA. According to Xu, Phan, and Tan (2022), neuroscience-based insights are useful for understanding user behavior on social networking sites (SNS). They focus on how users become more attuned to digital signals like notifications, likes, and an unending flow of new content, which encourages repeated use of platforms even if it does not lead to much enjoyment. This aligns with broader models of addiction, where the initial gratification sought, referred to as the “liking,” fades while the motivational and compulsive desires, the so-called “wanting,” persist (Robinson & Berridge, 1993, 2003). According to Wang and Lee (2020), human behavior on mobile social networking and content platforms can be compared to that exhibited in gambling systems. In their view, platforms use intermittent reinforcement by offering variable rewards, which keeps users checking and using the service. This is similar to payout patterns in slot machines, where it is the uncertainty that makes users become addicted. Scientific research supports the perspective that this reinforcement process has real consequences for how users behave.

In fact, based on Gerlach and Cenfetelli (2020), many users regularly access the platform without a specific purpose in mind. It appears that, over time, user engagement is driven by system design features, overriding conscious intention and resulting in repetitive behaviors lacking definite purpose. The habit formation process intensifies these patterns even more. Prolonged exposure to digital platforms may also be linked to everyday contextual cues (e.g., boredom, being in a line, getting up in the morning), as Xu, Phan, and Tan (2022) argue. Once formed, these habits allow for automatic consumption that does not require much conscious thinking. Gong et al. (2021) further develop this knowledge by suggesting a typology of obsessive technology use that

includes impulsive, compulsive, excessive, and addictive use, each distinguished by a different level of awareness and control of behavior on the part of the user. Their findings suggest that the first reflexive, impulsive engagement can become more entrenched and harmful, particularly once users are aware of the adverse consequences but are unable to regulate their activity. Furthermore, Gong et al. show that identity factors—in particular, IT identity (the degree to which use of technology becomes part of one's self-concept)—can mediate and amplify these behavioral trajectories. From such a perspective, technology becomes more than just a tool; it becomes an extension of the self, making disengagement psychologically costly and reinforcing compulsive use. A complementary view is provided by Kwon et al. (2016), who question the presumption that addictive digital behavior is an irrational affair. Based on rational addiction theory, they assert that the habitual usage of mobile social apps can reflect future-oriented behavior based on expected social utility. In their model, users derive value not only from instant gratification but also from maintaining long-term social presence and connectivity, which they call "social liquidity." The addictive tendencies seen on content platforms could therefore be the deliberate act of trying to retain or improve one's status in a dynamic social environment. This lens restates excessive use as socially driven self-control instead of sheer compulsion. Such an interpretation answers the question of why even low digital rewards can strongly maintain user engagement. For instance, as Lervik-Olsen et al. (2024) indicate, psychological phenomena such as fear of missing out (FOMO) create anxiety and guilt while being disconnected, motivating users to compulsively check the platforms and maintain constant digital connectivity despite the absence of clear external incentives. Collectively, these empirical findings point out that DA is not simply a case of excessive use of the internet. Rather, it is the result of a complex interplay between the design of the platform, the formation of habits, and emotional vulnerability, all of which may be especially amplified in environments such as SFV platforms.

2.1.3 Cognitive and Health Implications of Digital Overuse

A complementary research line in the digital addiction literature explores the cognitive distortions, emotional struggles, and health-related outcomes associated with excessive digital engagement. Instead of solely considering the mechanisms at the origin of addictive behaviors, this body of work draws focus to how addiction develops and changes over time, usually undermining users' psychological resilience and well-being. Knowledge of these internal dynamics is particularly crucial for creating adapted interventions that integrate the personal and societal costs of compulsive digital use.

Turel, Serenko and Giles (2011) offer early empirical evidence encompassing how users justify their compulsive use of technology. Their research points to one of the key paradoxes: people who overconsume digital products tend to consider their activity as functional or socially required, but rarely problematic. This cognitive distortion, justifying excess under the facade of productivity or connectivity, can mask the first signs of addiction and put off self-awareness. For the present study, this insight supports the point that users might not see overconsumption of SFV as harmful, supporting the call for proactive external interventions. But self-regulation can be even further challenged when looked at from a psychological perspective, specifically

through the conflicts between user intentions and actual behavior. According to Reinecke et al. (2022), many people express a strong desire to limit their exposure to digital technologies but are unable to follow up with this aspiration. Such a gap often provokes emotional discomfort, which paradoxically increases the platform use as a coping strategy, maintaining the addiction loop. Being aware of this mechanism is particularly helpful when willing to counter it, suggesting that a solution purely informative might be ineffective but should rather support the user to regain its self-regulation. In fact, the users are likely conscious of the amount of time they spend but simply unable to minimize it. From a health perspective, Fu et al. (2023) associate mobile application overuse with actual physical and psychological consequences, such as nomophobia (the fear of being separated from one's phone) and sleep pattern interruption. According to the Conservation of Resources (COR) theory, they argue that repeated digital participation gradually wears out the emotional and physiological resources of users. This long-term drain can erode resilience, and the user's ability to exercise self-control, leaving them more at risk toward the surge of addictive patterns. For the purpose of the present study, this relation demonstrates how overuse of SFV may not only be cognitively reinforced, but also biologically maintained through continuous exposure and fatigue, once again altering the self-regulative functions of the consumer. Finally, Venkatesh et al. (2019) expand the subject by looking at the broader social implications of DA. Researching children's internet addiction, they found that apart from the impact on end-users, overuse includes cascading effects on those in their social environment, for instance, the professional productivity and emotional condition of their parents. This means that DA should be examined across a broader range of layers—not only perceived as a personal struggle, but also as a systemic one, especially in families where young audiences are being exposed to new platforms such as TikTok or YouTube *Shorts*. This concretely advocates for effective interventions that would benefit the whole user's environment.

Overall, these studies indicate that the consequences of digital overuse go far beyond short-term distraction. It distorts user perceptions, alters psychological activities, and occasions individual and social costs. These cognitive and health-related dynamics only further justify the need to focus on regulatory interventions in increasingly immersive digital spaces.

2.2 Reducing Digital Addiction: Intervention Approaches

Digital addiction becoming an increasingly urgent concern, researchers have turned their attention to intervention strategies capable of disrupting compulsive usage patterns. This section reviews key approaches to reducing DA, beginning with a critical evaluation of why traditional awareness-based interventions often fail. It then explores interface-level design strategies that introduce friction to disrupt habitual use, followed by a discussion on personalized and adaptive interventions that align with users' psychological needs and behavioral profiles. Together, these insights outline the shift from passive information delivery to active, context-aware engagement strategies in combating digital overuse. Table 1 summarizes the prior research on digital interventions, warning effects, and nudging techniques that inform the arguments developed throughout this section.

Table 1. Prior Research on Digital Intervention Strategies and Underlying Theories

Variable(s)	Study	Sample	System(s) of Analysis	Description	Theoretical Perspective Used
Interface-level Friction	Liu et al. (2023)	Study 1 (N=120) Study 2 (N=140) Study 3 (N=141)	Smartphones	Compared press-and-hold vs tap to assess effect on engagement and self-regulation	Embodied cognition theory
	Olson et al. (2023)	Pre-post design (N=51) RCT (N=70)	Smartphones	Tested 10 nudges including grayscale, notification control, screen distance	Fogg Behavior Model
	Purohit et al. (2020)	Study 1 (N=14) Study 2 (N=67)	Social media	Developed and evaluated a Chrome extension disabling scroll, recommendations, and alerts	Hook Model; DSRM
	Zimmermann & Sobolev (2023)	112 Students	Smartphones	Compared effectiveness of friction intervention vs goal-settings	Digital nudging; Self-monitoring theory
Warning Effectiveness	Purmehdi et al. (2017)	243 effect sizes from 66 studies	Consumer products (e.g., tobacco, alcohol, food)	Meta-analyzed effectiveness of warnings across attention, comprehension, behavior change	Behavior change communication
	Vance et al. (2018)	15 Students	Internet	Compared user response to polymorphic vs static warnings	Habituation theory
Personalization	Biedermann et al. (2021)	Literature review of 28 interventions	Internet	Analyzed digital self-control interventions reducing media multitasking	Self-regulation theory
	Li, Wang & Wang (2021)	Study 1 (N=256) Study 2 (N=134) Study 3 (N=324)	Internet	Evaluate the effectiveness of nudges on procrastination in a peer-competitive environment	Social norms theory
	Zhou et al. (2023)	Simulated user interaction using bandit algorithm	Online healthcare platforms	Developed and tested a personalized digital nudging system to recommend health interventions	Reinforcement learning

Variable(s)	Study	Sample	System(s) of Analysis	Description	Theoretical Perspective Used
Theoretical Nudging Frameworks	Karahanna et al. (2018)	Theoretical model	Social media	Proposed framework linking psychological needs, affordances, and feature design	Self-Determination Theory; Affordance theory
	Valta & Maier (2022)	Systematic review of 88 peer-reviewed papers	Digital systems	Created taxonomy of digital nudges across 4 dimensions to systematize field	Behavioral economics

2.2.1 Why Static Interventions Fail

Earlier efforts to reduce DA have traditionally relied on static interventions, such as screen time notifications, app usage dashboards, or self-monitoring tools. These are typically designed to inform the user about their behavior, hoping that awareness will be converted into self-regulation. However, supported by our previous findings on how digital systems are actively disabling self-regulative functions, a growing body of evidence suggests that such interventions are limited in their long-term effectiveness. This is due to complementary phenomena, including habituation, poor adherence, and lack of contextual adaptability.

Vance et al. (2018) provide compelling neurocognitive evidence that users quickly become desensitized to repeated warnings. Their study consists of a multi-method approach combining fMRI scans, eye-tracking, and field experiments, showing that even high-stakes security warnings, critical for user safety, lose their impact when presented in a static or repetitive format. This phenomenon of habituation implies that overexposed stimuli fade into the background of user attention, reducing the probability that individuals will engage with or even recall them. In the context of DA, this suggests that standard alerts such as daily screen time notifications may initially attract attention but quickly become ineffective as users subconsciously filter them out. But the limitations of static warnings are not confined to technology use. Purmehdi et al. (2017) conducted a comprehensive meta-analysis covering 66 studies and 243 effect sizes on warning labels in consumer behavior domains, including tobacco, alcohol, and food products. They identify what they call a "diminishing cascade" of effectiveness: warnings show moderate effect sizes on attention ($r = 0.32$), comprehension ($r = 0.37$), and recall ($r = 0.31$), but much weaker effects on judgment ($r = 0.22$) and actual behavior change ($r = 0.18$). These findings suggest that while such warnings may successfully inform users, they rarely translate into long-term action. Particularly for moderation or cessation behaviors, which are highly relevant in DA, the gap between intention and sustained behavioral change remains large. Importantly, the study also identifies conditions under which warnings are more effective, such as preactivation (integrating them into broader strategies) and repeated, yet varied, exposure. Even if this study doesn't target specific digital products, it still provides serious hints on how warnings should be structured from a broader perspective. Zimmermann and

Sobolev (2023) extend these insights with a field experiment examining three types of digital interventions: (1) grayscale mode as design friction, (2) goal-setting through app time limits, and (3) simple screen time self-monitoring. Their findings confirm earlier assumptions: the weakest outcomes arise in the self-monitoring condition. Participants in this group were asked exclusively to track their screen time; no additional constraints or environmental modifications were involved. Despite being aware of their usage, the behavior changes remained minimal, reinforcing the idea that information alone is insufficient when facing habitual or emotionally gratifying contexts. Even in the goal-setting group, where participants voluntarily imposed time limits on app use, reductions in screen time were gradual and depended heavily on individual motivation, suggesting limited utility for high-risk users or those with weak self-control mechanisms.

In sum, looking collectively at these findings, we can underscore a fundamental design flaw in static interventions: they operate at an awareness level, with the critical assumption that the user will act rationally with self-restrictive reactions. Yet behavioral science and DA research show that much of technology use tends to be more habitual, emotionally regulated and resistant to simple awareness-based interventions. Therefore, as platforms become more immersive and attention-maximizing, interventions must not only inform users but actively reshape the interaction environment to counter the formation of automatic engagement patterns.

2.2.2 Designing for Friction and Behavioral Disruption

In response to the limitations of static warnings, recent research tends to integrate the role of interface design in disrupting these automatic digital patterns. One key concept outlined is the introduction of friction in the user experience, passively altering habitual use without relying on conscious self-regulative actions. Rather than presenting a result to the user, the interaction itself is modified, a promising approach for mitigating impulsive consumption.

Liu et al. (2023) provide an illustrative example of behavioral nudges through interaction mechanics. In their study on mobile touch modes, they find that requiring users to press and hold, as opposed to simply tapping, increased self-regulatory effort and task engagement. This observation draws on the embodied cognition theory, arguing that increasing the physical resistance within the interface would slow down the user response and ultimately prompt him to more reflective action. This finding is particularly salient in the context of compulsive platform use, where rapid, low-friction gestures like swiping or tapping are central to the addictive feedback loop. By engineering minor inconveniences into the interface, designers can encourage mindfulness and disrupt impulsive use. This concept is echoed in the work of Zimmermann and Sobolev (2023), who compare the effectiveness of three types of digital interventions. Two of them rely on self-monitoring, while the third one uses a grayscale mode, bringing visual friction to the interface design. Their observations directly support our previous findings: the participants who enabled grayscale mode on their devices showed immediate and significant reductions in screen time compared to control groups. Unlike goal-setting, which requires continuous self-discipline, grayscale functions passively by reducing the visual salience and making the whole device environment less stimulating. As an important takeaway, this confirms that even minor interface

changes, when well-targeted, can alter user engagement patterns without requiring effortful control. This is further expanded by Olson et al. (2023) through the test of a multi-layered digital nudge intervention. This experiment covered grayscale as well, but also notification suppression and brief lockouts before unlocking the phone. The result was that the combination of different friction strategies not only reduces usage but also enhances the perception of control and well-being of the consumer. This approach is rooted in the Fogg Behavior Model, which emphasizes the alignment of motivation, ability, and prompts. Rather than solely depending on willpower, these interventions manipulate the ability of the user by converting the undesired behavior, here the compulsive use, into a less gratifying and more difficult journey. Lastly, Purohit et al. (2020) develop a complementary design perspective in their study with the browser extension NUDGE, specifically targeted against social media addiction. Their tool is able to disable infinite scroll, hide algorithmic recommendations, and remove notification counters. These measures directly follow our way of thinking, providing solutions that reduce the cognitive load, redirect user attention, and do not feel directly punitive. Their preliminary evaluation suggests that such changes lead to more intentional platform use and reduce the overall time spent. More interestingly, the users also reported a more pleasant experience. This challenges the assumption that friction specifically designed to reduce the gratification of the use would negatively impact user satisfaction.

Together, these studies reveal that effective intervention does not always require direct confrontation or explicit reminders. Instead, subtle and passive alteration of the interaction flow, through gesture requirements, visual tone, or structural barriers, can disrupt automated behaviors and promote reflective engagement. In digital environments where speed, reward, and frictionless access are engineered to maintain attention, the reintroduction of friction may be one of the most promising strategies.

2.2.3 Personalization and Psychological Fit in Intervention Design

While friction-based approaches demonstrate immediate positive impact, seeking long-term reduction often requires deeper anchoring, accounting for individual motivation, cognitive control, and psychological needs. Therefore, we are now focusing on how to personalize solutions and tailor them to the specific user context, involving their behavior profile and evolving patterns of use.

A ground model of personalization is offered by Zhou et al. (2023) in their work on adaptive recommendation systems for healthcare. They employ a multi-armed bandit algorithm to dynamically adapt suggestions over time based on user behavior. Though originally applied in a medical context, the implications for digital addiction are clear: a one-size-fits-all approach cannot accommodate the diversity of user needs and responses. Their findings confirm that the most effective suggestions are the ones directly learned and adapted from the engagement patterns of the subject. This insight aligns with the theoretical framework proposed by Karahanna et al. (2018), who argue that technology use is driven by the fulfillment of psychological needs, such as autonomy, competence, and relatedness. Interventions that ignore or disrupt these motivational structures risk rejection or avoidance. Instead, effective intervention design should aim to acknowledge and work with these

needs: supporting autonomy by allowing flexible and user-directed control mechanisms, enhancing competence through clear, constructive feedback following goal-setting structures, and addressing relatedness by recognizing the social dimensions of use and offering alternatives that satisfy users' desire for connection without exploiting it. The idea is that interventions perceived as supportive rather than restrictive are more likely to be sustained and internalized over the long term, as they preserve alignment between the users' intrinsic motives and their digital engagement. Vaghefi et al. (2022) reinforce this notion, showing that hedonic information system addiction is driven by user needs, platform design, and failures in self-regulation. This implies that effective interventions must be able to address these same needs sought but without reinforcing compulsive use patterns. Concretely, not only the usage levels should be considered, but also why and how individuals are engaging with the technology in the first place. The case for customization is further backed by empirical evidence. Olson et al. (2023) discovered that letting users choose the combination of nudges they want among a range of options—such as grayscale, app timers, or lock screens—improved both the sense of control and adherence. Similarly, Biedermann et al. (2021) report that user demographics, in that case adults versus teenagers, or behavioral traits directly impact the effectiveness of interventions. Therefore, they emphasize that long-term behavior change depends mostly on adaptive feedback, with interventions calibrated to respond to user actions. Supporting this topic, Li, Wang, and Wang (2021) provide guidelines on adaptive interventions. Through a field experiment using peer-based nudges, they found that students who had previously struggled with self-regulation—evidenced by habitual procrastination or lower academic performance—were especially receptive to targeted prompts. These users, often the most at risk, showed better responsiveness than their high-performing peers. The study also showed that intervention effectiveness was shaped by contextual factors like competitiveness and group composition. For instance, in a competitive environment, male users showed heightened reactivity. These findings reinforce the idea that personalization should account not only for demographic or behavioral traits, as noted by Biedermann et al. (2021), but also for prior engagement patterns and social context. A warning or nudge that works well for one user may be ineffective, or even counterproductive, for another unless it aligns with their behavioral profile and motivational context. Finally, Valta and Maier (2022) contribute to the field with a systematic taxonomy aiming to guide the development of personalized nudges. They classify digital nudges along multiple dimensions such as intrusiveness, context, and user impact. Their framework constitutes a blueprint for matching interventions to specific user types and environments. Importantly, they stress the need for ethical alignment: personalization must not veer into manipulation, and transparency should remain a core design principle. This last point suggests that if users feel manipulated by these digital nudges, they will inevitably become less effective as trust decreases, even if they were initially aimed at the well-being of these users.

Collectively, these studies highlight the critical importance of personalization when it comes to designing digital interventions. Evidence shows that the tools with the highest level of effectiveness combine psychological dynamics and real-time adaptation while respecting user agency. Thus, when designing these interventions, one needs to consider technical excellence, knowledge of user motivation and habit formation, as well as distinct behavioral characteristics.

2.3 Rise of Short-Form Video and Its Unique Characteristics

Beyond user-related factors, effective intervention design also necessitates a deep understanding of the digital environment where it is deployed. Emerging content formats may introduce new elements and dynamics that impede the effectiveness of self-regulatory tools. SFVs are an example of a highly adopted yet understudied format in terms of interaction and resistance to intervention mechanisms. Therefore, to develop responsive solution design, the following sections explore the core characteristics of the SFV format and how it interacts with the consumer.

2.3.1 The Strategic Evolution of Platform Architecture

While DA can stem from habit and emotional vulnerabilities, a large number of researchers are pointing to a third lever: the intrinsic platform architecture of these digital systems. The claim is that if technologies are voluntarily engineered to shape, guide, and constrain user behavior, then we can't consider them neutral anymore (Zhang et al., 2019). From a socio-technical perspective, this means that digital behavior isn't solely "user-driven" but rather embedded in the tools themselves.

This non-neutrality is particularly visible in the context of SFV platforms. Gu and Zhao (2024) expose in their study how imposing a content length limitation could influence user interaction. In fact, they find that shorter duration tends to accelerate the consumption cycles, but also the intensity of peer engagement. For the current research, this confirms that when platforms such as TikTok restrict their uploaded content to 60 seconds, they are purposefully aiming to boost user attention. Reinforcing this notion of deliberate engagement optimization, Sim et al. (2024) dive into the "in-consumption information cues" (ICICs). In opposition to external cues, such as notifications previously mentioned, designed to bring back the consumer into the platform, these in-consumption cues are specifically designed to happen during interaction, for instance, displaying replay graphs from other viewers during video playback. Their findings reveal that such cues are able to improve user immersion, guiding users while they consume and removing the need for conscious decisions. This mechanism helps explain why self-regulation becomes more difficult: the engagement is reinforced in real time while happening, removing any selection points for the user. Moving beyond content features, platform competition also plays a major role in its addictive potential. Ichihashi and Kim (2022) propose an interesting model about the limitation of user attention. Based on the simple observation that digital platforms are evolving in a competitive environment, they are only granted a portion of the user's time. Therefore, strategically maximizing this time is a matter of survival, with user retention becoming the highest reward. This elucidates why these platforms are constantly improving the stickiness of their structure with infinite scroll, personalized feeds, or algorithmic novelty—they are incentivized to enhance addictiveness over user well-being. Complementary research supports these theoretical observations. Kang and Lou (2022) highlight that TikTok's parent company, ByteDance, identifies itself as an AI company rather than a traditional social network. This shift can be quickly confirmed from a consumer view. While earlier platforms were promoting social connectivity through feeds centered on friends and followers, TikTok greets users with a "For You" page—an

algorithmic stream of content carefully curated to keep individuals engaged. The emphasis is no longer on social interaction but on the quality of the algorithm's predictions. This shift is empirically validated by Zannettou et al. (2024), who conducted one of the first large-scale empirical studies on TikTok user behavior. They collected about 9.2 million videos over 120 days through 347 real users' consumption and found that only about 10% of the content viewed originated from followed accounts. This discovery is particularly insightful when we take into account that the total time spent and number of followers were increasing over the period, but the share of followed content remained mysteriously blocked at 10%. This means, on the other hand, that the platform was continuously pushing 90% of algorithm-selected content, regardless of prior user preferences. This finding is particularly relevant in explaining why this new content might be harder to disengage from: it removes the selection process from the user, redirecting them passively and continuously toward novelty.

Taken together, these findings illustrate that SFV platforms have deliberately aligned their design strategies to maximize user retention. Pushed by a competitive economic landscape, these "social media" platforms have quickly shifted to an algorithmic battlefield where user immersion and retention are the new standards. While the strategic focus has been identified, effectively countering it requires learning more about the core engine driving their purpose: their algorithms.

2.3.2 Algorithmic Personalization and the Feedback Loop

Building upon the evolution of platform architecture, one critical factor distinguishing SFVs is real-time personalization. Unlike traditional recommendation logics, which respond to explicit user preferences, these platforms interpret and act upon implicit signals to optimize their selections.

Bao et al. (2024) provide an in-depth analysis of this process on the short-form video platform Kuaishou, focusing on the Personalized Retrieval and Ranking (PR2) system. They describe how this system is able to analyze real-time interactions, including clicks, swipes, skips, and watch time, to refine the output recommendations. Crucially, PR2 operates at two levels: short-term impulses, driven by the direct actions the user initiates, and long-term preferences, modeled via another process commonly called the Query-Dominant Interest Network (QIN). This latter system performs a higher-level analysis in order to identify and predict future trends in user engagement patterns, allowing for constant and progressive adaptation that is perceived as "natural" from the viewer's perspective. Their deployment results demonstrated significant performance gains, with a 20% increase in total watch time and a 10% improvement in click-through rates. For the present study, this evidence highlights that personalization expands further than simple reactive processes—it can now also predict and drive behavior, once again improving the user's immersion and reducing exit options. These technical applications can be translated into what we more generally call a co-adaptive feedback loop. The user shapes the platform through interactions, and the platform shapes the user in return by refining content accordingly. Drawing from this concept, user feedback becomes implicit, less and less conscious, and builds a perfect cocoon over time, made of material increasingly suited to their expectations—greatly increasing the

risk of compulsive use. This is where we draw the line with neutrality, as this mechanism lacks visibility for the user, who often engages in the co-adaptive loop without clear consent. The superiority of personalized over non-personalized systems has been addressed by earlier research as well. For instance, Yang et al. (2017) found that personalized engagement models on mobile video platforms outperformed uniform models by 20% in user retention. These findings underscore the strategic advantage personalization offers in attention-driven economies, but they also offer some insight into how to counteract such mechanisms. What applies to engagement must also be true for disengagement, supporting the view that personalized interventions should yield better results than uniform ones.

In conclusion, SFV platforms' algorithms should not be reduced to improving user satisfaction; they are actively constructing it through comprehensive analytic systems capable of reacting in real time and predicting long-term user trajectories. Moreover, they take part in a co-adaptive feedback loop, indirectly reducing users' freedom of choice and gradually weakening their resistance. Being able to shed light on these hidden mechanisms is indispensable for designing solutions that disrupt these loops and restore user decision-making.

2.3.3 Short-Form Video as a Multisensory Stimulus

In addition to algorithmic personalization, another fundamental trait of SFVs is their extreme brevity. Unlike previous forms of digital content that could span several minutes or more, SFVs are often compressed into under 60 seconds, presenting the user with a complete cycle of entertainment, discovery, and emotional reaction within this short timeframe. Following our review progress, this design shift is far from being a cosmetic change. It is another piece supporting an entirely new digital engagement model.

When individuals are exposed to more information than their cognitive system is able to handle, a reaction called cognitive overload arises. This phenomenon, rooted in the cognitive load theory, is explained in the study of Roetzel and Fehrenbacher (2019). It usually emerges when one is exposed to a load of information with a volume, speed, and complexity higher than their processing capacity, resulting in a breakdown of their reasoning and reflective functions. Saunders et al. (2017) complement this view, pointing out that the occurrence of such defensive mechanisms is not only based on the quantity (the amount of information), but also on the emotional and attentional charge linked to it. In other words, on top of how much information one can process, the way this information is presented can also play a role, leading to quicker saturation when it is high affect or inconsistent.

Looking back to the SFV format, the short duration and rapid turnover of videos expose the user to quick, successive bursts of entertainment, constant emotional shifts, and fast-paced alternation of themes (Haliti-Sylaj and Sadiku, 2024). This strategy aligns with previously demonstrated mechanisms: by saturating the user's cognitive function, they quickly lose their capacity for reflection and are more likely to shift into a passive mode of consumption. A passive state, particularly suited to the architecture of these platforms, which, as exposed earlier, requires minimal cognitive input and allows for seamless, engine-driven navigation. This notion of cognitive overload is further supported by Qin et al. (2022), who shed light on the spectrum of

reactions activated by SFVs. Each video pulled exposes the user to visual, auditory, emotional, social, and motivational factors, which combine with the short duration to alter attention and affective response. The claim is that by proposing a video-only environment, SFVs are able to trigger an even wider range of stimuli at once, enhancing and accelerating the saturation process. Liu (2022) notes that the only way for the user to avoid cognitive fatigue and cope with the pace of the content is to enter a phase of temporal dissociation. In this mode, users succumb to the frictionless design: as no decision points are required, they simply follow the path drawn by the platform. As a result, consumers might lose track of the time they spend, experiencing time distortion and, more importantly, becoming progressively desensitized to the content they watch.

In fact, another crucial element is the imbalance created between the high level of gratification perceived due to the stimulus saturation and the low difficulty required to access this rewarding content. In this context, the brain will grade SFV rewards as “low” due to their easy access (Zhang et al., 2019). Each time the user wants to reach the same level of satisfaction, it will require watching more content and spending more time in the loop, which directly reflects the pattern of addiction formation. This supports the idea that, to restore users' awareness of the time they spend, we should begin by reintroducing decision points within the platform, aimed at disrupting this 'flow-like' state.

In sum, the unique structure of SFVs merges two important factors of DA previously discussed: brevity (Gu and Zhao, 2024) and variability (Wang and Lee, 2020). It appears that SFVs aren’t necessarily rewriting the concept of online video but are strategically combining the elements that boost user engagement. By overwhelming the user’s cognitive and perceptual systems, they push toward passive consumption and accelerate exposure to rewards, which in turn reduces the time available for reflection or disengagement, laying the foundation for addictive responses.

2.3.4 Emotional Vulnerability and Escapism

While structural and sensory elements significantly contribute to the addictive nature of SFVs, individual emotional vulnerabilities further compound the difficulty of disengagement. Key drivers such as stress, anxiety, and emotional regulation deficits are increasingly pointed out by emerging studies.

Liu, Ni, and Niu (2021) explore how perceived stress serves as a major antecedent of SFV addiction. Their study demonstrates that users often turn to SFV as a self-compensatory mechanism, for instance seeking immediate emotional relief from real-world pressures, facilitated by the rapid gratification cycle and easy access that SFVs provide. However, while these platforms offer temporary alleviation, they also foster dependency over time because the underlying sources of stress remain unaddressed. For the present research, this insight is major, showing that SFVs not only capitalize on user vulnerabilities but could also worsen them. This creates an emotional escapism loop: users turn to SFVs to escape stress, SFVs provide temporary relief, users disengage, stress returns because it remains unaddressed, users turn to SFVs to escape stress - again. But this also draws broader considerations. Addicted users might associate the content or the platform with the temporary stress relief received through this escapism process, thereby forming emotional bonds. Sun et al.

(2024) support this view by analyzing the implications of maladaptive metacognitive beliefs in problematic SFV use. These maladaptive beliefs are distorted thoughts that reinforce anxiety or poor self-regulation, such as believing that avoiding problems is helpful. The findings support that users with unresolved stress are particularly prone to using SFVs as an avoidance strategy, which reinforces both their emotional vulnerabilities and their attachment to the platform or content. Both views echo previous digital intervention studies that advocate against punitive warnings. Instead, this potential escapism should be acknowledged, and interventions should support the user in coping with the root causes behind the behavior.

Moving back on distorted perception, both Yue et al. (2024) and Zhu et al. (2024) link SFV compulsive use with unmet psychological needs. More specifically, social ones and how the user might perceive his social support. They demonstrate that offline environments directly influence SFV consumption, therefore, the same way users interact with these platforms to cope with stress (Liu, Ni, and Niu, 2021), they interact to cope with loneliness (Yue et al., 2024) or entertainment (Zhu et al., 2024). The main concern being that when trapped in the escapism loop, users develop expectancy biases, which are an overestimation of one's ability to fulfil relational or emotional needs. As the gratification decreases over time, these expectancy biases increase and the user, consciously or not, reinforces the compulsive use in order to maintain satisfaction of these needs. In this condition, without external support, the formation of addiction is almost inevitable.

Building on the emotional dimension, we can turn to the Opponent Process Theory, applied by Tian, Bi, and Chen (2023) to the SFV context. According to this theory, originally formulated by Solomon and Corbit (1974), any emotional reaction triggers, as an after-effect, an opposing reaction. In other words, a situation generating pleasure is often followed by a kind of discomfort or withdrawal. In our short-videos environment, users experience these positive emotions by rapid bursts while scrolling. However, following this framework, disengaging will subsequently bring dissatisfaction and withdrawal. This phenomenon directly supports the addictive patterns previously discussed and the formation of escapism loops. The brevity of these positive emotions triggers equally quick downturns, reinforcing the compulsive use, not merely to seek more pleasure but rather to avoid discomfort. Turel and Serenko (2012) reinforce this dynamic by showing that perceived enjoyment could also play a key role in the formation of maladaptive use. Their findings suggest that even in the absence of actual negative counter-effects, the positive experiential factor alone was a driver of compulsive use. To understand this concept, we have to introduce the formation of habits: users perceiving joy from an activity every time they engage with it are more likely to repeat that behavior. Over time, the use becomes habitual, no longer goal-directed but more an automatic response to internal or contextual cues. Ultimately, this repeated positive reinforcement leads to compulsive use. The authors put the accent on how this emotional oscillation can be resistant to change, as the behavior is directly linked to joy or emotional relief but not fundamentally perceived as detrimental. These last observations directly echo a common development pattern in DA, when the use is justified in the user’s eyes and therefore not considered problematic (Turel, Serenko and Giles, 2011). For the current study, this justifies the need for interventions able to interrupt the reward cycle before the self-reinforcing occurs.

Taken together, these findings underline the central role of emotional drivers. Addicted users aren't rational agents but are influenced by internal psychological predispositions and cognitive distortions. In a digital environment where users are emotionally dependent on the system, any attempt to reduce their consumption must account for their emotional state, particularly when the excessive use is not perceived as harmful but rather as a positive emotion, and when disengagement is accompanied by withdrawal-like symptoms.

2.3.5 Cognitive Impairments and Executive Dysfunction

While we have been able to cover structural, sensory, and emotional factors leading to SFV overuse, we still need to discuss the actual cognitive vulnerabilities targeted and how they are able to weaken the very self-regulative function of the users. Among them, attention control, memory function, and decision-making seem to be the most impacted.

Through eye-tracking experiments, Chen et al. (2023) provide empirical evidence demonstrating that users with high levels of SFV addiction have greater difficulty in sustaining their focus and a higher level of interference in information processing. These findings suggest that the fast-paced, ultra-stimulating environment proposed by SFV content may degrade executive functions over time. This corroborates earlier assumptions: disengagement becomes, in fact, more difficult, not simply based on willpower, but also because the related cognitive faculties are impaired. This insight is highly relevant when it comes to digital awareness, implying that interventions must be cognitively accessible, in contrast to the fast, flashy, and sensory-dense nature of SFVs. This aligns with the earlier point that effectively disrupting automatic use requires prompting reflection and decision-making, while avoiding reinforcement of the loop and further degrading the user's responses (Vaghefi et al., 2022).

But the cognitive impairments are various. Xie et al. (2023), for instance, illustrate that SFV addiction indirectly predicts academic procrastination among university students. This supports the connection between weakened attentional control and behavioral traits such as high boredom proneness. The concern brought by this finding is that, over time, the deterioration of one's attentional capacity could impact and degrade the core ability to redirect attention toward goal-oriented tasks. This validates the idea that effective personalized digital interventions should be able to reconnect users with their goals and reflect their intrinsic motives (Karahanna et al., 2018).

Another important cognitive function investigated by Chiossi et al. (2023) is memory, more specifically, prospective memory (PM), defined as the ability to remember to perform planned actions after an interruption, and how this can be impacted by multiple digital formats. This topic is highly relevant for our study, as PM is directly linked to self-regulation and goal maintenance (e.g., remembering to stop scrolling to perform another task). The research involves 60 participants performing a particular task. This task is then paused for a ten-minute break. During this break, participants are allocated to one of four activities: rest, browsing Twitter, watching YouTube, or using TikTok. After the break, participants resume their initial task, and the study assesses the impact of the break on their prospective memory. This study facilitates a direct comparison

between the SFV app, exemplified by TikTok, and other digital media like Twitter, which primarily feature text and occasional images, as well as YouTube (only 10-minute-long videos). The results show that while Twitter and YouTube have no observable effect, participants in the TikTok condition experience a significant decline in PM after the break, confirming the impairment of cognitive function for the user. This also explains why users might experience stronger resistance toward voluntary disengagement, as user retention is achieved through this cognitive degradation, gradually blinding users' prior intentions.

Collectively, these studies confirm the impact on the user's cognitive functions, further supporting that self-regulation is weakened or even impossible depending on the degree of impairment. The ability of this content to dissociate the user from temporal notions and their broader environment calls for digital interventions that would guide and reorient the user, almost acting as a cognitive reset.

2.4 Public Concern and Research Gap

The previous section helped us identify the key mechanisms of SFV platforms, which, far from being neutral technologies, include various components capable of capturing user attention, lowering self-regulative functions, and exploiting emotional or cognitive vulnerabilities. With the growing evidence of impairment linked to this overuse, we also understand that in such conditions, the development of addiction is at higher risk and cannot solely be placed on the user's responsibility. A growing body of research tends to outline this accountability shift, which should include SFV platforms and regulators as well. Therefore, this section will gather insights on public health concerns and emerging policy responses that have been addressed worldwide, supporting us in identifying concrete solutions and potential gaps.

2.4.1 Public Concern: Shifting the Burden from Users to Platforms

So far, the literature aligns on a certain notion: the addictive nature of SFVs cannot be reduced to user preference or a lack of self-control. Instead, as Berthon et al. (2019) reaffirm in their public policy analysis, DA is deliberately induced through marketing strategies rooted in the very structure of digital platforms. Users are not engaging in irrational harmful consumption, they are in fact, most of the time, conscious of the time they spend or the stress they are trying to escape, but get caught in the addictive loop of the content, which is purposefully shaped by design features and engineered algorithms to maximize engagement. Following the rise of this format and the rapid adaptation, it is not surprising that we have seen a similarly rapid increase in public health evidence. For instance, Pardhan et al. (2022) outline that excessive screen time among children and adolescents is linked with various negative outcomes such as sleep disruption, eye strain, reduced physical activity, or even an increase in child obesity. These findings point to collective issues moving beyond individual patterns, and the younger population, often targeted by this new media, is greatly impacted by these systemic flaws. Chung and Lee (2022) support this view through a public health model that treats DA as the interplay of 1) platform design, considered the *agent*; 2) the users, considered the *host*; and 3) the broader digital *environment*, which includes digital accessibility, social norms, and existing policies. This perspective

aligns with our current observations, where user vulnerabilities cannot alone account for the negative results experienced. Instead, platform providers and regulators share equal responsibility.

Despite similar inclusive frameworks, most of the public discourse still categorizes digital overuse as an individual issue, removing the implication of any external actors and further delaying the study or implementation of necessary safeguards. In the current context of SFVs, which are becoming a dominant mode of interaction in the digital landscape, the urgency for inclusion of these external actors in any counterplan appears imperative, especially when considering the young audience they are targeting. However, as Berthon et al. (2019) highlight, structural constraints must be considered. They suggest that recognizing a problem is not always sufficient to guarantee intervention. Especially when dealing with digital products of such worldwide spread, it becomes even more challenging to address each actor's responsibilities. It is also important to note that in an economic and strategic landscape tightly linked to the very concept of user engagement, proposing actions to reduce it may be pushed back, inevitably delaying concrete solutions. These challenges do not deprecate the value of digital interventions or tools aimed at disengaging users, but they are important to consider within a broader view, including economic, legal, and societal factors.

Therefore, our research aligns with a wider movement toward external actor accountability, outlining that the implementation of embedded tools is no longer at the theoretical stage but has become a practical necessity. As Berthon et al. (2019) emphasize, self-regulation is no longer a solution, and the current passive awareness diffused by public policy should shift to active regulation, able to inform, guide, and restrict design features that target and amplify compulsive use. The present study aims to directly contribute to this path of thinking, bringing reflection and control to the user through actual digital intervention while acting independently of user incentives.

2.4.2 Policy and Legal Landscape: The Under-Regulated Nature of Digital Addiction

While public concern about digital addiction keeps growing, this domain remains under-regulated in most regions of the world, particularly in Europe. However, some countries in Asia, suffering from a more intense digital consumption, have already seen important and restrictive regulations being implemented, marking a sharp contrast with the West. Yet, as government involvement might be challenging, it is crucial to explore precedent regulatory interventions to understand what is replicable from these attempts.

Starting with China, which implemented in 2019 one of the strictest online gaming and youth protection control systems. This system initially imposed playtime restrictions, limiting minors to ninety minutes of gaming per day during the week and three hours per day on weekends and holidays. This policy was further reinforced in 2021, reducing playtime to one hour, regardless of weekends or holiday periods. These restrictions used real-name registration and facial recognition to verify the identity and age of users (Zhan & Chan, 2012). In such a context, we have an example of policies directly backed by the government, holding platforms responsible for negative outcomes affecting their users. When looking back to our previous findings, such intervention could appear too severe, as it directly restricts the user in their consumption. This could be received as a

punitive or manipulative solution and could alter acceptance and long-term user reflection. Yet, while online gaming was the primary target, streaming platforms were also impacted by these changes, restricting night-time access and limiting algorithmic recommendations. These changes align better with our overall idea of providing subtle changes able to reduce the gratification of the use while letting the user remain in control, promoting a healthier and more responsible consumption.

Another Asian country worth the study is South Korea, which reports a high internet use rate among adolescents. They implemented in 2011 the "Shutdown Law", blocking access to online gaming platforms between midnight and 6 a.m. for children under sixteen years old. Ten years later, in 2021, this law was actually revoked in favor of a self-regulatory framework advocating stronger parental control. Although it has become more flexible, the state anchor is still strong and they provided platform providers with clear guidelines, encouraging them to include playtime warnings, fatigue systems, and features allowing parental monitoring (Zhan & Chan, 2012). The government's role is also illustrated in their investment through public education campaigns and funding in internet addiction counselling centers.

The contrast with European regulatory actions lies in the recognition of DA and internet disorders as real mental health issues. As raised in our first section, the broader acceptance of behavioral addiction is key to adequate institutional responses. Some interventions in Europe remain, however, promising. For instance, following the Digital Services Act (DSA), platforms are now accountable for the spread of illegal content or disinformation. A first step that is necessary but limited, as it still does not address compulsive design features such as infinite scroll, variable ratio rewards, or emotionally engineered algorithms, a troubling mismatch when such application exists for other recognized addictive products such as gambling or tobacco.

In fact, while aiming to address DA, it is important to contextualize and explore how traditional forms of addiction have been addressed. Common practices often rely on two main concepts: 1) access limitation, such as restricting the sale of alcohol under a certain age; and 2) warning mechanisms, which include controlled and limited advertising, as well as clear packaging warnings like those found on tobacco products. Now, when looking at digital formats or SFV platforms that target minors, they remain largely underregulated in comparison. Berthon et al. (2019) emphasize that this regulatory gap allows platforms to continuously redesign their models, maximizing user engagement without facing consequences for their consumers' well-being. This aligns with the framework from Chung and Lee (2022), previously mentioned, which takes into account both environmental and agent-level factors. It suggests integrating countermeasures directly into the design of digital products, delivering access control and content regulation similar to what other addictive products are subject to, or, more drastically, to South Korean and Chinese regulations. Our study therefore contributes to addressing this regulatory gap by providing practical insight into what such design-based regulations could look like, in line with international calls for future legal and health strategies.

2.4.3 Research Gap: The Missing Evidence on Embedded Interventions

When it comes to DA, one convergence point seems to be observed among authors from psychological, public health, or regulatory literature. This point concerns the origin of DA, which, far from being user-driven, has been shown to be directly embedded in the digital tools themselves, presenting severe cognitive risks. However, despite this recognition, the information systems field remains silent when it comes to actual empirical foundations that would assess these concerns. In fact, legal scholars and public health experts have begun to propose frameworks or policy models, but they require concrete evaluation to ensure their viability in real digital contexts, especially when it comes to ever more sophisticated media such as SFVs.

In such an empirical gap, it is important to contextualize our experiment and explore the historical trajectory of other sub-categories of DA, such as online gaming, which has already earned much more attention in the last decade. One of the most comprehensive studies on the topic has been provided by Zhan and Chan (2012), who analyze the different measures implemented by China and South Korea to mitigate DA risks among adolescents. An important takeaway for our chain of thought is how they advocate for anticipatory regulation in line with observable patterns of compulsive engagement. Concretely, if different digital products sharing similarities in their design start presenting the same addictive features for their users, then actions should be directly leveraged from earlier attempts instead of waiting for wider acceptance and long-term longitudinal data. In our case, while online gaming has gained more global recognition, we keep holding back our resources when similar patterns begin to emerge in social media and SFV use.

Among other articles, even if the concept of embedded tools is sometimes framed differently, the core mechanisms coincide. Berthon et al. (2019), for instance, call for “deaddictive” design that would break from the marketing choices and features sustaining user engagement. While they acknowledge the limited empirical data available for regulators, they propose a framework in line with our literature, promoting interruptive techniques that could be inserted into digital interfaces, informative nudges that would prompt the user to reflect, and break cues that keep an emotionally neutral tone. Equivalently, Chung and Lee (2022) challenge behavioral guidelines that account only for user control, asking for broader models that incorporate embedded warning mechanisms, limited accessibility, or regulated content. Lastly, Carter and Johnson (2023) suggest that platforms themselves should offer tools for users to track and manage their screen time, given that they are most familiar with the dynamics and behavioral patterns their systems create.

In conclusion, all three views suggest design-level interventions, but neither of them proposes actual trials or metrics on how such interventions could be evaluated— a critical mismatch in the case where industry or policymakers would start adopting such actions.

Therefore, this present research aims to bridge and cover the multiple gaps highlighted in the last section, responding from an information systems perspective to public health and regulatory calls, blueprinting on other digital systems such as online gaming with a similar historical trajectory. Unlike prior studies relying on self-regulation or screen-time metrics, our experiment will be directly embedded in an SFV environment, taking into account the numerous underlying addictive mechanisms and introducing friction warnings that break the

immersive loop designed by these platforms. In short, while legal scholars have recognized the urgency of intervention, empirical research has yet to produce actionable evidence. This thesis contributes to closing this gap by testing an academically backed solution aligned with existing public health models and policy recommendations.

3 Theoretical Grounding and Hypothesis Development

Building on the literature review, this section develops the conceptual foundation for our hypotheses. The aim of this study is to assess the potential of embedded digital interventions to mitigate addictive patterns associated with short-form video (SFV) consumption. Prior research has identified multiple psychological and behavioral mechanisms driving compulsive engagement with SFVs, alongside findings on the effects of digital self-regulation tools. Understanding the design features of these platforms and their behavioral implications is essential to contextualize intervention outcomes. This section consolidates these insights and articulates a set of theoretically grounded hypotheses regarding the expected impact of such interventions on user behavior.

3.1 User Immersion and Temporal Dissociation

SFV platforms are engineered and designed to maximize immersion. From a platform perspective, this is achieved through the suppression of all kinds of decision points: content autoplays, scrolling is endless, and interaction requires minimal effort—often just one finger (Zannettou et al., 2024; Sim et al., 2024). Simultaneously, the content is algorithmically curated in real time to match users' short impulses and long-term preferences (Bao et al., 2024). This personalization ensures that the user remains immersed by continuously offering content that resonates with their interests and engagement patterns (Yang et al., 2017).
On the format side, the design follows the same logic: a content limited to videos, delivering visual and auditory stimulation through purposefully shortened durations, rarely exceeding 60 seconds (Gu & Zhao, 2024; Haliti-Sylaj & Sadiku, 2024). As a result, users are exposed to a fast-shifting stream of emotionally engaging videos, often leading to cognitive overload—a state where the brain receives more information than it can efficiently process (Roetzel & Fehrenbacher, 2019; Qin et al., 2022). In this state, users naturally shift into a more passive mode of consumption, responding automatically rather than consciously (Liu, 2022).
Flow Theory (Csikszentmihalyi, 1990) provides a lens to understand this experience. Flow occurs when individuals experience intense concentration, reduced self-awareness, and a distorted sense of time while engaged in an activity that balances challenge and skill. SFVs foster this state by offering rapid, low-effort gratification, which reduces the need for conscious decision-making and promotes automatic engagement (Qin et al., 2022; Liu, 2022). One natural outcome of such passive consumption is temporal dissociation, where the user gradually loses track of time and attention regulation (Liu, 2022; Chen et al., 2023).
Within this context, embedded digital warnings may act as external prompts that break this immersive flow. According to the *Fogg Behavior Model* (Fogg, 2009), a well-timed prompt can trigger reflection when ability and motivation are aligned. In other words, the appearance of a digital warning could introduce a pause in the automatic chain of consumption, prompting the user to reflect on their usage and restoring time awareness (Zimmermann & Sobolev, 2023; Olson et al., 2023). Thus, we hypothesize:
H1: Users exposed to a digital warning will spend less time on the platform and report lower temporal dissociation compared to those not exposed to such warnings.

3.2 Habit Formation, Reward Cycles, and Affected Self-Regulation

The *Theory of Planned Behavior* (Ajzen, 1991) provides a useful framework to understand the psychological mechanisms behind compulsive digital use. According to this model, behavior is influenced by three main factors: attitude toward the behavior, perceived social norms, and perceived behavioral control. The latter refers to the extent to which individuals feel capable of regulating their own actions. When perceived control is high, individuals are more likely to form the intention to act and follow through with it. In contrast, when perceived control is low, even strong intentions may not translate into action.

In the context of SFV consumption, where users gradually lose control over their scrolling, this concept is particularly relevant. As described earlier, these platforms are physically designed for comfort: minimal input, high stimulation, and seamless interaction (Zannettou et al., 2024; Sim et al., 2024). But beyond this interface, the fast-paced and emotionally charged nature of the content trigger deeper neurological patterns. In fact, the stimulation provided by the rapid shifts of videos induce an equally rapid set of emotional responses, which over time weakens the user's natural regulation mechanisms (Qin et al., 2022; Liu, 2022).

This weakened self-regulation is further impacted by the real-time refinement of content. Each time a user receives a video that matches their taste, the brain reacts with a positive feedback signal, including a dopamine release (Grant et al., 2010). These mechanisms mirror those observed in slot machines, with an unlimited variety of content combined with unpredictable gratification (Wang & Lee, 2020). However, due to the extreme ease of access and the minimal effort required to obtain this reward, its subjective value quickly drops (Zhang et al., 2019), pushing users to seek more and more in order to reach the same level of satisfaction (Liu, 2022; Turel & Serenko, 2012). This trap the user in a pleasure-seeking loop, which over time reinforces compulsive engagement (Robinson & Berridge, 2003).

This cycle forms the basis of behavioral addiction patterns, where initial engagement gradually turns into habit. As the brain becomes increasingly sensitive to platform-related cues, the user is pulled back into the loop automatically, without conscious intent (Gong et al., 2021; Xu, Phan & Tan, 2022). At this stage, self-regulation becomes extremely difficult. Even if the user is aware of the excessive use or willing to stop, the behavior has become habitual (Reinecke et al., 2022). Motivation alone is no longer sufficient (Vaghefi et al., 2022).

In this context, digital warnings can act as an external support for self-regulation. The appearance of a digital warning functions as a momentary disruption, helping to regain awareness of time spent and encouraging reflection on use (Zimmermann & Sobolev, 2023; Olson et al., 2023). Drawing on the *Theory of Planned Behavior* (Ajzen, 1991), this moment of awareness may increase perceived behavioral control and help resist impulsive consumption. Thus, we hypothesize:

H2: Users exposed to a digital warning will report greater perceived control and lower compulsive urges compared to those not exposed to such warnings.

3.3 Behavioral Profiles and Emotional Dependency

While the previous sections focused on technical features and their interaction with cognitive reflexes, a third important component is the emotional bond that users develop with the content. As emphasized in the literature, this emotionally charged content triggers a wide range of responses depending on the behavioral profile and motivational context of each user (Yue et al., 2024; Sun et al., 2024; Zhu et al., 2024).

One key aspect to consider is the role of emotional regulation. Due to the ease of access and the rapid gratification SFVs provide, many users engage with this content as a way to escape stress or real-life pressures (Liu, Ni & Niu, 2021). In such cases, a digital interruption that feels too abrupt or invasive may be rejected by the user, fostering more stress and even increased consumption as a coping mechanism (Sun et al., 2024). But the diversity of these user profiles is extensive. Many also engage with SFVs to maintain social presence and connectivity, driven by anticipated social value or *fear of missing out* (Kwon et al., 2016; Lervik-Olsen et al., 2024). These motives are often shaped by offline realities, for instance, loneliness or weak social support can deepen reliance on the platform. This leads to expectancy biases, where users overestimate the platform's ability to fulfill their needs, further reinforcing compulsive use (Yue et al., 2024; Zhu et al., 2024). Understanding these varied emotional drivers is essential, as any intervention that ignores them risks being perceived as intrusive and ultimately not accepted by the user. This aligns with findings in the digital intervention literature, which warn against using uniform or static warnings, as these often fail to resonate or trigger meaningful reflection (Purmehdi et al., 2017; Zimmermann & Sobolev, 2023).

On the contrary, warnings that are personalized or feel contextually relevant tend to generate better outcomes (Olson et al., 2023; Biedermann et al., 2021). Users are more likely to respond when the message matches their emotional state or use motivations (Li, Wang & Wang, 2021). This suggests that the effectiveness of an intervention increases when it takes into account not just usage behavior, but the emotional and motivational background behind it (Karahanna et al., 2018; Vaghefi et al., 2022).

Moreover, we can assume that being able to specifically target and resonate with the user's context will improve the perceived usefulness and relevance of the intervention. Drawing on the *Technology Acceptance Model* (Davis, 1989), these two perceptions are key drivers of adoption: the more helpful and personally meaningful a tool is perceived to be, the more likely it is to be accepted and used as intended (Valta & Maier, 2022). In this light, we hypothesize:

H3: Users exposed to targeted motivational warnings will report greater perceived usefulness and a higher intention to adopt the intervention than those receiving uniform messages.

4 Methodology

This study employs a between-subjects experimental design to investigate whether embedded digital interventions can reduce compulsive short-form video (SFV) consumption. Grounded in the Information System field, the methodology centers on the design and empirical evaluation of such intervention within a realistic usage context. The aim is to assess both behavioral and perceptual responses, contributing actionable insights for future similar design development.

The following sections expand on the methodology. They begin with an overview of the research design, followed by a detailed account of the intervention designs and their theoretical foundations. This is followed by a description of the experimental environment and platform deployment, the participant recruitment and sampling strategy, the experimental procedure, and the post-exposure survey and outcome measures. The methodology concludes with the analysis strategy and a discussion of the ethical considerations.

4.1 Research Design Overview

This study aims to develop and evaluate a digital intervention intended to reduce compulsive engagement with SFV platforms. Drawing from the Information System field, the research compares and combines two established strategies for promoting digital self-regulation: friction-based awareness and tailored behavioral cues**.** Both interventions are integrated directly into the browsing experience of a custom-built SFV interface and are intended to disrupt the immersive, flow-like user experience characteristic of platforms like TikTok. The principal objective is to determine whether such interventions can measurably restore user awareness, increase perceived control, and reduce compulsive behavior.

To test the effectiveness of these interventions, the study employs a between-subjects experimental design. The sample consists of 82 participants aged between 18 and 25 years old, a group identified in prior research as particularly prone to compulsive SFV use. Each participant was randomly assigned to one of three conditions: (1) a control group receiving no warning, (2) a group exposed to uniform timer-based warnings, and (3) a group exposed to a combination of timer-based warnings and varied targeted motivational messages. These groups are respectively referred to as *Test 0*, *Test A*, and *Test B* throughout the experiment. All participants engaged with the same video content via a custom-designed, scroll-based SFV platform that replicates real usage dynamics while deliberately omitting social interaction features to isolate the effect of the intervention. The experiment was conducted remotely, with participants using their own devices in naturalistic environments to maximize ecological validity. All outcomes were self-reported by participants through a post-exposure survey completed immediately after the test.

The evaluation focuses on both behavioral and perceptual outcomes, in direct alignment with the study's three hypotheses. Behaviorally, success is measured by a statistically significant reduction in time spent on the platform (H1), with the combined timer and motivational messages (*Test B*) expected to outperform the uniform-timer condition (*Test A*). Perceptual outcomes include increased self-reported control and reduced

compulsive urges (H2), as well as higher perceived usefulness and greater intention to adopt the intervention when motivational framing is included (H3). This dual focus allows for a comprehensive assessment of both the immediate behavioral impact and the underlying psychological acceptance of the intervention.

To capture these outcomes, the survey instruments were grounded in four established theoretical models. The Fogg Behavior Model (Fogg, 2009) explains how motivation, ability, and well-timed prompts interact to influence behavior, supporting the assessment of prompt effectiveness. Flow Theory (Csikszentmihalyi, 1990) provides the conceptual basis for measuring user immersion and temporal dissociation (H1). The Theory of Planned Behavior (Ajzen, 1991) informs the evaluation of perceived behavioral control and intention to disengage (H2). Finally, the Technology Acceptance Model (Davis, 1989) guides the measurement of perceived usefulness and acceptability of the intervention (H3). This theoretical integration ensures that the constructs underlying each hypothesis are accurately operationalized through validated measurement frameworks.

This methodological approach combines theoretical grounding with an applied digital intervention tested in a realistic SFV environment. It directly reflects and responds to the gaps identified in the literature review, particularly the need for embedded, empirically tested tools that go beyond passive self-monitoring. As highlighted by authors across information system, behavioral science, and public health, existing solutions such as static warnings or app-level restrictions have limited long-term impact, often due to habituation, emotional vulnerability, and weakened self-regulation. In contrast, this study introduces real-time, in-context interventions that actively disrupt compulsive patterns by operating independently of user motivation or intent. Finally, by combining timer-based and motivational warnings in a live platform environment, the experiment seeks to generate practical insights into how digital architecture can be strategically modified to support user agency.

4.2 Intervention Design and Theoretical Rationale

Building directly on the insights established in the literature review, this section first synthesizes the key psychological, cognitive, and structural mechanisms driving compulsive use in SFV environments. The goal is to show how these mechanisms were translated into concrete design features that informed our digital intervention. Next, it outlines how these features were implemented across three test groups to empirically address the previously formulated hypotheses. By explicitly linking each component of the intervention to empirical findings and theoretical rationale, this section ensures transparency and strengthens the validity of the design choices made prior to testing. This step is essential not only for assessing whether the intervention works, but also for understanding why it works and under which assumptions it was developed. Table 2 below summarizes these foundations by mapping each core mechanism identified in the literature to its corresponding design principle, theoretical reference, and practical implementation within the intervention.

Table 2. Theoretical and Design Rationale for Intervention Features

Dimension	Principle	Literature Insight	Implication for Design Feature
User immersion	Intervention must reintroduce a decision point to break passive, automatic flow	Liu et al. (2023); Olson et al. (2023)	Warning pauses and hides the video; requires user action ('Resume')
Temporal dissociation	Intervention must restore time awareness during use	Liu (2022); Qin et al. (2022); Roetzel & Fehrenbacher (2019)	Warning displays live session time
Cognitive overload	Warnings must contrast with an overstimulating environment to reduce the gratification cycle	Liu (2022); Qin et al. (2022); Saunders et al. (2017); Zimmermann & Sobolev (2023)	Black-and-white text, calm tone, no images, video, or sound
Executive dysfunction & impaired control	Message should be short and clear to support comprehension and reflection	Chen et al. (2023); Chiossi et al. (2023); Xie et al. (2023)	One-sentence message; easy to understand
Psychological and emotional reinforcement	Non-judgmental, empathetic prompts enhance user receptivity	Liu, Ni, and Niu (2021); Turel & Serenko (2012); Sun et al. (2024)	Supportive message; normalizes overuse; freedom of choice "Resume" or "Take a break"
Personalization	Tailored prompts outperform uniform ones	Yang et al. (2017); Zhou et al. (2023); Vaghefi et al. (2022); Li, Wang, and Wang (2021)	Prompt targets common impairments likely relevant to most users
Habituation effect	Warning content should vary to maintain salience	Vance et al. (2018); Purmehdi et al. (2017)	Randomized rotation of six messages to avoid desensitization
Ethical transparency	Users must understand why they are seeing the message to avoid feeling manipulated	Valta & Maier (2022); Karahanna et al. (2018)	Informative tone; explains platform or content mechanisms

4.2.1 Friction-Based Awareness

Both user immersion and perceived control are psychological mechanisms that contribute to compulsive SFV use, but they operate at different stages of the engagement cycle. Immersion and temporal dissociation (H1) reflect the initial loss of time awareness and passive engagement driven by flow states, while perceived control and compulsive urges (H2) relate to the user's struggle to disengage even after awareness returns. To empirically test these two hypotheses, we developed a friction-based intervention designed to target both mechanisms simultaneously, guided by insights from the literature.

SFV platforms are known to generate a cognitively overloaded environment optimized for seamless engagement through emotionally charged, fast-paced content (Qin et al., 2022). This setup induces a flow-like

state that suppresses conscious regulation and promotes passive consumption (Liu, 2022). To disrupt this state, the intervention introduces an external warning that pauses and overlays the video feed, forcing an interruption in the automatic consumption loop (Olson et al., 2023). Additionally, to restore the user's time awareness, the warning includes a live session timer intended to make the user more conscious of the time spent, thereby prompting reflective awareness. Visually, this warning is designed in deliberate contrast to the platform environment: minimalist, calm, and stripped of stimulating elements. The goal is not to capture attention through appeal, but to introduce a moment of friction and reduce the gratification of the experience (Saunders et al., 2017; Zimmermann & Sobolev, 2023). To ensure accessibility in a cognitively saturated context, the message is short, direct, and easy to understand, facilitating comprehension for users experiencing reduced attention or impaired decision-making capacities (Chen et al., 2023). Finally, to reinforce the decisional break and improve perceived control, the user must actively press a "Resume" button to continue watching, further slowing the engagement cycle and creating a reflective pause within the automatic, seamless flow (Liu et al., 2023).

The principles described here directly informed the construction of the first version of our intervention—*Test A*—an external, friction-based, warning with a live session timer that periodically activates to disrupt immersive flow, restoring both temporal awareness and perceived control.

4.2.2 Tailored Behavioral Cues

While the first version of our intervention was designed to interrupt immersive flow and restore user control (H1–H2), the literature suggests that compulsive SFV use is also shaped by deeper emotional and motivational drivers that cannot be addressed through friction alone. To capture this additional dimension, a third hypothesis (H3) was introduced to assess whether interventions aligned with the user's motivational context and behavioral profile would receive higher perceived usefulness and acceptability. This dual-level analysis expands the scope of our investigation by incorporating prior research on the effectiveness of personalization[1] in digital self-regulation. We outline here how these considerations informed the development of an enhanced version of the warning, combining the live session timer with targeted behavioral cues.

Multiple studies emphasize that the effectiveness of digital interventions increases when they are personalized, especially for users experiencing low self-regulation, emotional vulnerability, or habitual overuse (Zhou et al., 2023; Biedermann et al., 2021). This supports the notion that compulsive engagement is not limited to an immersive environment but is also rooted in psychological and emotional processes (Sun et al., 2024). For this reason, any interruption must be designed not only to break attention but also to respect the user's mental state and motivational context. Accordingly, our warning does not simply prompt disengagement; it begins by explaining why the user is seeing the message. This aligns with ethical design principles: we do not aim to manipulate but to expose the often-invisible mechanisms that drive prolonged use (Valta & Maier, 2022). As

[1] In this study, "personalization" does not imply real-time user-specific customization. Instead, it refers to the use of varied, pre-formulated messages designed to simulate relevance across common user experiences.

the literature shows, users often remain engaged not out of ignorance, but because platforms are engineered to retain them by exploiting automatic and subconscious responses (Vaghefi et al., 2022). Acknowledging this reality increases the warning's legitimacy and transparency, helping users to view their overuse as understandable rather than shameful (Liu, Ni, & Niu, 2021).

Moreover, SFV use is frequently a form of emotional escape, as users seek temporary relief from stress, anxiety, or real-life pressure (Turel & Serenko, 2012). Our intervention therefore avoids punitive or judgmental phrasing. Instead, it adopts a supportive tone, showing empathy toward the user's behavior and reinforcing the idea that they are not at fault. This is critical, as disengagement from an addictive loop can trigger discomfort or mild withdrawal symptoms. The warning is thus positioned not as a restriction but as guidance—a nudge toward better control without undermining the user's autonomy (Karahanna et al., 2018; Berthon et al., 2019). In this spirit, we include, in addition to the message, a clear but non-imposing suggestion: "Take a break." This optional action invites users to pause or exit while preserving freedom of choice. The user remains fully in control and can ignore the message if they wish, consistent with research showing that voluntary decisions are more effective for long-term behavioral change than forced interruptions (Yang et al., 2017).

Finally, the literature strongly warns against using static interventions. Repeated exposure to identical warnings leads to rapid habituation, reducing their salience and impact (Vance et al., 2018). In addition, emotional responses to interventions vary significantly across individuals, what feels empathetic to one user may feel patronizing to another. For this reason, our message pool is varied in tone and phrasing, even though the timing of appearance remains fixed. This variation increases engagement, avoids desensitization, and acknowledges that no single warning fits all users (Zhou et al., 2023). Crucially, this variation also serves as a mechanism to operationalize personalization within the boundaries of our design. While true personalization would involve user-specific adjustments based on real-time data, similar to the algorithms employed by commercial SFV platforms, our intervention instead simulates this by rotating a diverse set of messages. These prompts target distinct but widely reported issues identified in our findings. Although not tailored to individual users, this variation increases the likelihood that each participant will encounter a message that resonates with their experience, thereby preserving relevance without requiring dynamic personalization.

These insights directly informed the design of the second version of our intervention—*Test B*— combining the timer with a set of rotating, empathetic motivational messages crafted to acknowledge user vulnerability, maintain transparency, and simulate personalization while preserving user autonomy.

4.2.3 Intervention Design

Drawing from these key theoretical and empirical insights, we designed two experimental conditions, tested against a control group, in order to analyze both the individual and combined effects of friction-based awareness and tailored behavioral cues. Figure 1 provides a visualization of the experimental structure.

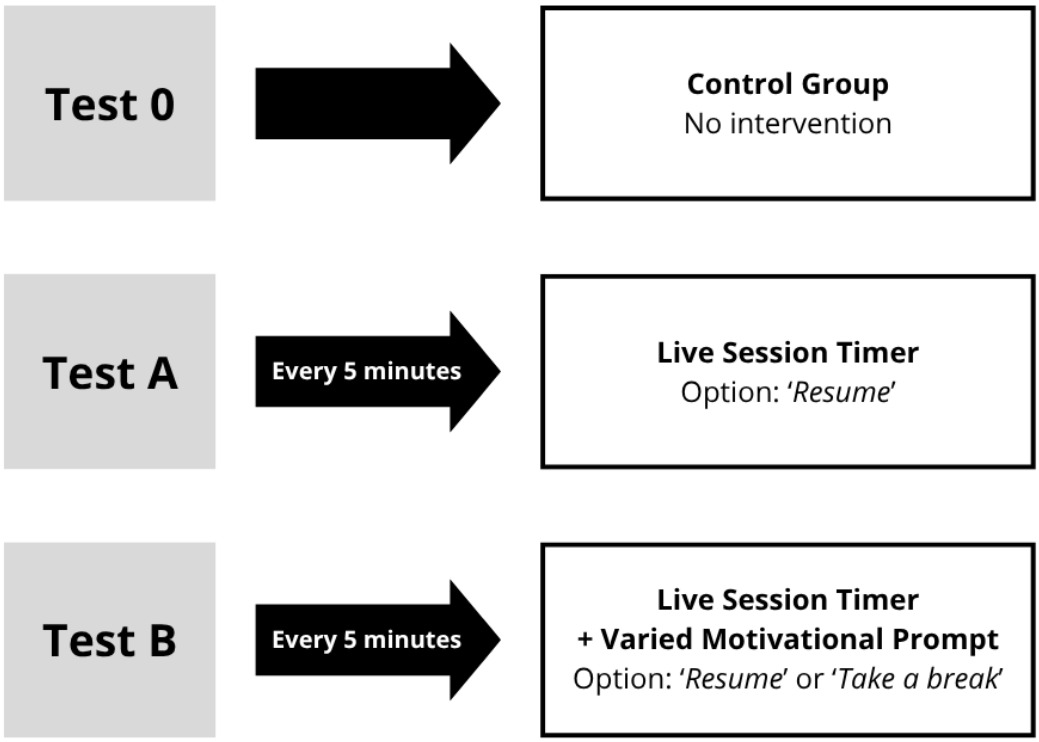


Figure 1. Intervention Design and Experimental Structure

The control group (*Test 0*) receives no intervention and serves as a baseline for measuring natural engagement behavior on the platform. The first experimental condition (*Test A*) introduces neutral, time-based warnings delivered at five-minute intervals. These warnings are designed to interrupt immersive browsing and reinforce users' temporal awareness without causing frustration or alert fatigue. To support this re-anchoring process, the warning pauses the video, completely overlapping the content, and requires the user to press a "Resume" button in order to continue watching. The five-minute interval was selected to balance user awareness with the risk of alert fatigue, a phenomenon well-documented across domains such as healthcare and user interface design. In clinical settings, frequent alerts have been shown to diminish responsiveness over time, highlighting the need for optimal spacing to preserve salience (Kane-Gill et al., 2017). Similarly, research on mobile app notifications found that higher message frequency increases app uninstalls and lowers engagement, underlying the importance of moderation in alert delivery (Wohllebe et al., 2021). Thus, our five-minute cadence is calibrated to interrupt immersive states without triggering frustration or fatigue, while remaining in step with the high-speed dynamics of SFVs, where users typically scroll through over a dozen videos in just a few minutes.

The second treatment condition (*Test B*) incorporates the same timing mechanism but adds targeted motivational prompt to each warning. These messages are short, supportive, and explicitly framed to acknowledge the user's experience while revealing the structural mechanisms that drive compulsive use. Rather than applying pressure or inducing guilt, the messages adopt an empathetic tone and include a clear, optional suggestion: "Take a break." In this condition, the user must again press "Resume" to continue, but

now encounters a dual-choice interface offering either to resume or to disengage. This dual prompt is designed to enhance the reflective pause and reinforce a sense of control, aligning with behavioral theories that emphasize the importance of voluntary decision-making in long-term habit change. To avoid habituation and address the diversity of motivational profiles, a rotating pool of six distinct prompt have been formulated. Although not individually personalized, this variation increases the likelihood that users encounter messages that resonate with their current state. Table 3 summarizes the content of these messages, the behavioral insights they reflect, and the literature grounding each design choice.

Table 3. Motivational Prompt Breakdown

Prompt	Behavioral Motive Targeted	Literature Insight
This content may be addictive	Raises awareness of compulsive use and addictive design mechanisms	Tao et al. (2010); Lervik-Olsen et al. (2024); Xie et al. (2023)
Long screen time affects attention	Highlights executive function decline and attention fatigue	Xie et al. (2023)
Rapid visual content may strain your eyes over time	Links overstimulation to physical discomfort and user fatigue	Chen et al. (2023)
This format is built for nonstop scrolling	Exposes structural reinforcement and infinite consumption design	Bao et al. (2024); Sim et al. (2024)
Breaks can restore focus	Encourages self-regulation and cognitive reset	Olson et al. (2023); Sun et al. (2024)
This platform is designed to make you lose track of time	Reveals temporal dissociation as a platform effect	Qin et al. (2022); Sim et al. (2024)

By comparing the effects of simple friction versus friction combined with motivational guidance, the study explores whether interventions that engage both the cognitive and emotional dimensions of user experience are more effective in reducing compulsive SFV use. The next section presents the experimental environment developed to implement and evaluate those interventions.

4.3 Platform Architecture and Experimental Setup

To empirically test the effectiveness of our digital interventions and address our three hypotheses, a critical point was to ensure environmental validity. Our experiment should simulate the user experience of SFV platforms such as TikTok while maintaining full control over intervention delivery. To do so, a custom-built web application was developed using native HTML and JavaScript within CodePen, a browser-based code editor that allows real-time development and deployment of front-end web interfaces. This section outlines the technical design and architecture of the platform, showing how it replicates core SFV dynamics while enabling precise manipulation of intervention variables.

4.3.1 Platform Structure and Interface

The platform was developed as a browser-based single-page application designed to simulate the interaction style of real SFV platforms. Upon loading the experiment page, participants are first presented with a start screen featuring three clickable options labeled “Test 0,” “Test A,” and “Test B.” These labels correspond to the three experimental conditions—control, timer-only, and motivational-warning—but are intentionally non-descriptive to conceal the nature of the intervention and reduce expectancy effects. Upon loading the page, an internal script randomly highlights one of the three options in yellow, and participants are instructed to select the highlighted button to begin. This mechanism ensures random group assignment while maintaining full experimental blinding. A screenshot of the landing page is provided in Appendix A.

Once the experiment begins, users interact with a vertical, full-screen video feed. These videos autoplay and transition automatically or through swipe gestures, closely mimicking the seamless flow of typical SFV platforms. The video dataset is hosted on Cloudinary, a cloud-based media management service, and embedded into the page through injected <*video*> tags. To ensure experimental consistency, all participants view the same curated set of approximately 50 videos in identical order. Critically, the platform omits social interaction elements such as likes, comments, and shares. This design choice reflects evidence from the literature suggesting that while such features may contribute to broader platform engagement, they are not the primary drivers of compulsive use in SFV environments (Kang & Lou, 2022; Zannettou et al., 2024). Additionally, this ensures that observed behavioral outcomes can be more confidently attributed to the intervention itself. A visual example of the platform interface is provided in Appendix B.

4.3.2 Intervention Implementation

The intervention was implemented through a custom JavaScript function, *startTimer()*, which controls the injection of the different digital warnings at fixed time intervals. In both treatment conditions (*Test A* and *Test B*), a *setInterval* function was set to display the warning every five minutes. Each apparition pauses the video feed and fully overlaps the screen, disrupting the visual flow until the participant interacts with it. The warning includes a live session timer indicating how long the participant has been watching (e.g., “You’ve been watching for 6m 13s”), designed to reintroduce time-awareness. In both treatment groups, a “Resume” button is required to continue playback. In *Test B*, a second optional button labeled “Take a break” is added, inviting users to voluntarily disengage. If selected, this button immediately exits the experimental page by redirecting the browser to a blank screen, effectively ending the session. Additionally, participants in *Test B* receive a motivational message displayed above the buttons. The selection is randomized with equal probability each time a warning is triggered, simulating lightweight personalization and reducing habituation through variation in tone and content. Examples of both warning interfaces are shown in Appendices C and D.

4.3.3 Video Dataset and Content Selection

The video dataset used in this study was compiled directly from TikTok, using a newly created account with no prior search history, follows, or user interactions. This strategy ensured that the platform's algorithm generated a feed based solely on its default recommendation logic, unshaped by personal behavior or interests. This method was selected to simulate the early-stage SFV experience common among new users, which research suggests is driven primarily by algorithmic novelty and platform architecture rather than deliberate content choices (Gu & Zhao, 2024; Zannettou et al., 2024). No thematic filtering was applied beyond basic quality control, ensuring that only videos with sufficient visual and audio clarity were retained. This open selection process reflects real-world SFV use, preserving heterogeneity while ensuring technical comfort.

The final video set was calibrated to support up to 30 minutes of continuous scrolling, including about 50 videos ranging from 20 to 60 seconds, an empirically grounded duration. While recent research emphasizes that DA is less about time per se and more about patterns of compulsive and automatic use (Reinecke et al., 2022; Gong et al., 2021), prior studies suggest that flow-like immersion, temporal dissociation, and passive engagement typically emerge after several uninterrupted minutes of exposure (Liu, 2022; Haliti-Sylaj & Sadiku, 2024). By sustaining a session length long enough to reach this cognitive threshold, the platform creates adapted conditions to measure the disruptive potential of the embedded interventions. This collection method thus ensures both ecological realism and experimental consistency, while aligning with a conceptual understanding of digital overuse as a structurally and cognitively reinforced process, rather than a simple concept of screen time.

The next section outlines the sample characteristics and recruitment approach used to test this digital intervention.

4.4 Sample and Recruitment Strategy

To assess the effectiveness of embedded digital warnings during SFV consumption, this study recruited a sample of 82 participants aged 18 to 25. This demographic was deliberately selected based on consistent findings in the literature that highlight younger users' heightened vulnerability to compulsive SFV use, characterized by elevated screen time, emotional sensitivity, and reduced executive functions (Liu et al., 2021; Xie et al., 2023).

Participants were recruited through student WhatsApp groups, professional networks, and personal referrals—channels chosen for their direct access to individuals most likely to engage with SFV content. This targeted approach improves ecological validity by aligning the sample with real-world usage patterns, while also improving internal validity by minimizing variability linked to demographic differences. Group assignment was randomized through the experiment's web interface. Upon launching the session, each participant was automatically assigned to a condition, using in-code randomization logic. This ensured that group allocation remained unbiased and concealed from both participants and researchers.

Although modest in size, the sample is appropriate for early-stage, between-subjects digital intervention research, where the primary aim is to assess feasibility and directionality rather than generalizable statistical claims. Similar digital intervention studies frequently rely on comparable or slightly larger samples. For instance, Zimmerman and Sobolev (2023) identified moderate treatment effects using a three-group design with 112 participants (~37 per group). Biedermann et al. (2021) highlight that digital self-control interventions often draw on samples ranging from 12 to 20 participants. Likewise, Li, Wang, and Wang (2021) demonstrate that randomized digital messaging interventions can show meaningful results with group sizes between 49 and 120 participants. Furthermore, restricting the sample to a narrow age increases the likelihood that observed differences across conditions are attributable to the intervention itself. Future research could build on this framework by broadening the sample across multiple age groups.

The next section details how participants engaged with the experiment in practice, clarifying the conditions and procedure.

4.5 Experimental Procedure

Participants were introduced to the experiment through a survey link, which served for pre-exposure instructions and post-exposure assessment. In the introduction, participants were presented with a high-level explanation stating that the study aimed to investigate consumption behavior on platforms like TikTok. They were asked to try a custom-built platform replicating the SFV experience. To preserve the integrity of the experimental conditions and avoid priming, no mention was made of digital warnings or the actual intervention being tested. The survey then directed participants to the experimental platform via a separate link and provided clear instructions for the session. Specifically, participants were informed that upon loading the platform, they would see three test groups, and that they should click the highlighted option to begin. Importantly, they were told to remember which test they were assigned to, as they would be required to return to the survey and report it after completing their session.

The concept of "completion" was intentionally framed in open-ended terms: participants were encouraged to replicate a normal SFV browsing session without any specific target duration or endpoint. This instruction was designed to avoid introducing artificial signals—for instance, the appearance of a warning—that might influence user behavior on when to stop. Likewise, in the control condition, this approach prevented users from browsing longer than they naturally would in anticipation of an indicator of completion. Participants were explicitly instructed to behave exactly as they would on any regular SFV platform, without overthinking their actions or modifying their behavior. To further reinforce realism, they were encouraged to use their own usual device, helping to preserve the familiarity of the environment and simulate an everyday digital context.

This remote, decentralized design aimed to simulate a naturalistic SFV usage experience while still maintaining experimental control, in line with the literature emphasizing that compulsive engagement is often subconscious and structurally reinforced rather than fully intentional (Gong et al., 2021; Reinecke et al., 2022). Once the browsing session was complete (either because the participant reached the end of the video feed or chose to

exit earlier), they were expected to return to the original survey link and continue with the post-exposure questions. This follow-up occurred immediately after the session, ensuring temporal proximity and minimizing recall bias. While this setup naturally limits the level of control over participants' physical environments and behavior, it was a conscious trade-off to increase ecological validity. By letting participants use the platform on their own devices, in familiar settings, and without any researcher observation, the study was able to capture more realistic and authentic responses. Participants were also clearly informed that their data would remain anonymous and be used only for research.

In line with those privacy commitments, no behavioral data were collected through the platform itself, all analysis is based solely on what participants reported in the post-exposure survey, presented in the following section.

4.6 Post-Exposure Survey and Measures

Following completion of the browsing session, participants were redirected to a post-exposure survey. This instrument served as the primary tool for assessing the impact of the intervention and provided the data used to evaluate the study's three hypotheses. To ensure the immediacy and authenticity of participants' reflections, the survey was designed to remain short, between 7 and 12 items, depending on the test group. It began with a brief set of screening questions confirming demographic eligibility and regular use of SFV platforms. To avoid priming participants or triggering defensive reactions, all items were phrased in a neutral manner and deliberately avoided terms such as "addiction" or "overuse."

The survey focused on three core dimensions: 1) temporal dissociation and flow disruption, which aimed to capture the extent to which participants lost track of time or became overly immersed in the browsing session; 2) perceived control and compulsive urge, focusing on whether participants felt able to regulate their usage and whether they experienced internal conflict during their engagement with the platform; and 3) intervention impact and future acceptance, assessing participants' awareness of the warning messages, their emotional and cognitive responses to them, and their openness to similar features being implemented on mainstream platforms. Each item of the survey was informed by established theories in psychology and information system research. The specific questions, along with their corresponding constructs and theoretical foundations, are summarized in Table 4. The following subsections explain each survey dimension and its theoretical grounding in more detail.

4.6.1 Temporal Dissociation and Flow Disruption

The first dimension of the post-exposure survey focuses on participants' subjective experience of time and attention during their browsing session. This corresponds to Hypothesis 1: *Users exposed to a digital warning will spend less time on the platform and report lower temporal dissociation compared to those not exposed to such warnings*. The assumption is that uninterrupted exposure to SFV content leads to greater absorption and reduced awareness of time, whereas the introduction of warnings may disrupt this immersive loop.

Table 4. Summary of Post-Exposure Survey Measures and Conceptual Basis

Survey Item	Scale	Construct	Literature Insight
Approximately how many minutes did you spend watching videos?	5-min intervals + "Not sure"	Time Awareness and Distortion	Flow Theory (Csikszentmihalyi, 1990)
I lost track of time while watching the videos.	7-point Likert		Flow State Scale–2 (Jackson & Eklund, 2002)
I watched for longer than I intended.	7-point Likert		Meerkerk et al. (2009)
I felt in control of my video watching during the session.	7-point Likert	Perceived Control and Internal Conflict	TPB (Ajzen, 1991)
I could have stopped watching at any time if I had wanted to.	7-point Likert		TPB
I felt a strong urge to keep watching, even when I considered stopping.	7-point Likert		PMUM (Domoff et al., 2019); CIUS (Meerkerk et al., 2009)
I kept watching even though I didn't plan to.	7-point Likert		PMUM; CIUS
Do you remember seeing a message during the session?	Yes / No	Intervention Recall	
The message made me reflect on my usage.	7-point Likert	Cognitive and Emotional Response	Fogg Behavior Model; Design Friction Theory (Mejtoft et al.)
The message felt supportive and helpful.	7-point Likert		TAM (Davis, 1989)
I would like to see such reminders in real short-form video platforms.	7-point Likert	Acceptance and Perceived Usefulness	TAM
These kinds of reminders could help me use social media more intentionally.	7-point Likert		TAM

This section draws primarily on *Flow Theory* (Csikszentmihalyi, 1990), which describes the psychological state of deep immersion characterized by focused attention, reduced self-awareness, and distorted time perception. To assess this construct, the survey combined both cognitive and behavioral indicators of temporal dissociation. Participants were first asked to estimate how long they had spent on the platform, using a series of predefined five-minute intervals. This format ensured consistency across responses and supported comparisons between groups. A "I am not sure" option was also provided to account for participants who could not accurately recall session duration—particularly relevant for those in the control group, where the absence of warnings may have made time tracking more difficult. In addition to retrospective time estimation, participants responded to items that captured the subjective experience of immersion. One item assessing perceived time loss was adapted from the *Flow State Scale–2* (Jackson & Eklund, 2002), a validated tool originally developed for physical activity but since applied to media and gaming contexts. Its adaptation for this study allowed us to directly measure whether participants felt they lost track of time while using the

platform. A third item assessed whether participants felt they had watched longer than they intended, drawing on constructs from the compulsive internet use literature (Meerkerk et al., 2009). This allows to identify potential mismatches between participants' intentions and their actual actions. Those items used a 7-point Likert scale to capture the intensity of each experience. This approach enabled more sensitive measurement of variation across conditions and allowed for nuanced comparisons in perceived immersion and self-regulation. Together, these measures formed a comprehensive assessment of flow-related dissociation. By combining the subjective time perception with a behavioral self-assessment, the survey aimed to capture if the intervention effectively reintroduced a moment of awareness in the automatic and immersive loop of SFVs.

4.6.2 Perceived Control and Compulsive Urge

The second dimension of the post-exposure survey evaluates participants' sense of self-regulation and internal conflict during the browsing session. This corresponds to Hypothesis 2: *Users exposed to a digital warning will report greater perceived control and lower compulsive urges compared to those not exposed to such warnings*. While the first dimension focused on the experience of time and immersion, the second outlines the participants' ability to control their usage and the psychological tension that may occur in the context of compulsive use.

This dimension draws on two primary theoretical foundations. The first is Ajzen's *Theory of Planned Behavior* (TPB), which identifies perceived behavioral control (PBC) as a key factor shaping intention and action. In the context of SFV use, this refers to a user's belief that they can stop using the platform if they choose to. The second perspective draws from empirical instruments originally developed to assess problematic and compulsive digital engagement. One of them is the *Compulsive Internet Use Scale* (CIUS) developed by Meerkerk et al. (2009). This scale was created to assess problematic internet use in adults and focuses on patterns such as excessive time spent online, unsuccessful attempts to cut back, and continued use despite negative consequences. Although developed in the context of general internet behaviors, core elements such as the inability to stop, preoccupation with use, and emotional reliance are conceptually compatible with the case of SFV consumption. In addition, we considered the *Problematic Media Use Measure* (PMUM) by Domoff et al. (2019), which was designed to help parents report on the compulsive screen use of their children. The PMUM assesses symptoms such as difficulty stopping, irritability when interrupted, and screen use interfering with daily routines. While the original target group and reporting method differ from our study, the underlying behaviors it captures are commonly shared by SFV users. In this study, these constructs were carefully adapted to the SFV context and rephrased as self-report items suitable for direct administration.

Participants rated their agreement with statements that reflected both their perceived control and any signs of internal conflict during the session. These included their confidence in being able to stop if they wanted to, and the extent to which they felt attracted to keep watching even when they had considered stopping. A 7-point Likert scale was used to allow for sensitivity in response, capturing subtle variations in self-regulation and tension.

The theoretical insights of TPB combined with adapted elements from compulsive use instruments allow this dimension to precisely evaluate if the intervention restored a sense of agency in the user perception.

4.6.3 Intervention Impact and Design Acceptance

The third and final dimension of the post-exposure survey assesses participants' perception of the intervention and their openness to similar design features in real digital environments. This corresponds to Hypothesis 3: *Users exposed to targeted motivational warnings will report greater perceived usefulness and a higher intention to adopt the intervention than those receiving uniform messages*. The objective was to evaluate not only whether the warnings were noticed, but also how they were received emotionally and whether participants believed such features could contribute to more intentional platform use.

The survey items from this section draw primarily on the *Technology Acceptance Model* (TAM) (Davis, 1989), which identifies perceived usefulness as a key driver of a user's intention to adopt a new technology. In this context, if participants perceived the embedded warning messages as helpful, constructive, or behaviorally supportive, they were more likely to express openness to similar features in mainstream SFV platforms. To complement this, we also incorporated insights from design-focused behavioral models, including the *Fogg Behavior Model* and *Design Friction Theory* (Mejtoft et al., 2019). These models emphasize the importance of embedding brief moments of reflection within user interfaces, particularly in digital environments that promote automatic engagement.

Importantly, this set of items was only administered to participants in the two intervention groups (*Test A* and *Test B*), as the control group received no warnings. The items in this section measured whether participants noticed the message, whether it prompted reflection, and whether it was experienced as helpful or disruptive. Additional items assessed their openness to seeing such reminders on actual platforms, and whether they believed such features could support more intentional use of social media.

Taken together, the three dimensions of the post-survey—temporal dissociation and flow disruption, perceived control and compulsive urge, and intervention impact and design acceptance—form an integrated framework for evaluating the user experience and behavioral implications of the embedded warning intervention. Each survey dimension was grounded in established theoretical models and adapted to the specific challenges of SFV environments. This structure not only enables a robust test of the study's hypotheses, but also provides broader insights into how interface friction can promote user reflection, enhance perceived control, and increase design acceptability in immersive digital contexts.

4.7 Data Analysis Strategy

Given the exploratory nature of this study and the moderate sample size, data analysis focused on descriptive statistics and group comparisons to identify meaningful patterns across the three experimental conditions.

Survey responses were exported from Google Forms and processed in Microsoft *Excel*. After excluding respondents outside the 18–25 age range, participant data were grouped by condition (*Test 0*, *Test A*, and *Test*

B). Mean scores and standard deviations were calculated for all Likert-scale items to evaluate each construct: temporal dissociation, perceived control, disengagement ability, and intervention evaluation.

To compare group means, one-way ANOVA tests were conducted using *Excel*'s Analysis ToolPak to assess whether differences between groups were statistically significant. Group sizes, response completeness, and internal consistency were verified prior to analysis. No imputation was applied, as there were no missing responses in the final dataset. A double-check of the statistical approach and interpretation was performed using *ChatGPT*. Further details regarding the use of AI tools in this study are provided in Appendix E.

This analytic approach allowed for both statistical comparison and interpretation of directional effects, reflecting the goal of understanding how different intervention types may influence user experience and self-regulation. Key findings are reported in the Results section.

4.8 Ethical Considerations

All participants took part voluntarily and were informed in advance about the general aim of the study. Response collection was fully anonymized through Google Forms, with no names, contact details, or identifying metadata recorded. As a result, it was not possible for the researchers to trace any responses back to individual participants.

The intervention design was carefully constructed to avoid any language or framing that might be perceived as judgmental or distressing. In particular, the motivational warnings (*Test B*) were explicitly designed to be supportive and respectful of user autonomy.

5 Results

The following sections present the main empirical results of the study, starting with a review of the sample characteristics and verification of the experimental setup's validity. Next, the findings are organized by hypothesis, covering session duration, temporal dissociation, perceived control, and the evaluation of the intervention itself. Each outcome is assessed across the three experimental groups to determine whether the digital warnings impacted user experience and self-regulation. The key findings are summarized in the final section.

5.1 Sample Characteristics

A total of 91 individuals participated in the experiment. Consistent with the literature emphasizing elevated vulnerability to compulsive use of SFVs among young adults, only participants aged 18 to 25 were retained for analysis. This filtering step resulted in a final sample of 82 participants, helping to reduce demographic variability and strengthen internal validity. Participants were recruited through university networks, professional groups, and personal contacts, as outlined in the methodology.

In addition to age screening, eligibility was limited to individuals who reported daily use of SFV platforms, ensuring ecological validity and increasing the likelihood that participants already exhibited compulsive usage patterns—an essential condition when testing tools aimed at reducing such behaviors.

Participants were assigned to one of three experimental conditions via an internal randomization in the custom-built platform. While exact group sizes differed slightly due to this process, allocation remained balanced: 29 participants in the control group (*Test 0*), 26 in the timer-only group (*Test A*), and 27 in the targeted warning group (*Test B*).

All participants completed both the platform session and the post-exposure survey, providing complete data across all three conditions.

5.2 Manipulation Check and Environmental Validity

Before evaluating the main hypotheses, it was essential to confirm that the experimental setup successfully reproduced the conditions necessary for meaningful testing. In line with the requirements from the literature and our methodology, we needed to ensure that: (1) participants perceived the interventions as intended, and (2) the custom-built platform recreated the immersive environment typical of SFV use.

To assess delivery, participants in both intervention groups were asked whether they recalled seeing a message during the session. Across both test groups, 88.7% responded affirmatively, confirming that the interventions were reliably triggered and visible.

To validate that the platform successfully replicated the psychological dynamics typical of compulsive SFV use, we focused on two key constructs outlined in the methodology. First, temporal dissociation, which reflects the tendency of users to shift into passive, immersive consumption and lose track of time. This was assessed

by asking participants whether they lost track of time during the session. Second, compulsive urge, defined as the feeling of wanting to stop but being unable to do so. This was captured through participants' self-reports on whether they watched longer than intended. The mean score for temporal dissociation was M = 4.42, and for perceived overconsumption, M = 4.56 (on a 7-point scale), indicating that most participants experienced the dissociative and compulsive feelings documented in the literature. These values confirm that the platform recreated the immersive conditions necessary to accurately test embedded digital warnings designed to disrupt flow.

Lastly, as emphasized in the methodology, the effectiveness of the targeted motivational warning depends not only on visibility but also on tone. For an intervention to be effective, the message must feel supportive and non-judgmental, rather than punitive or moralizing. To assess this, participants in *Test B* were asked whether they found the message "supportive and helpful." The mean response was M = 6.15, suggesting that the tone of the intervention was interpreted as intended, aligning with behavioral design principles.

Together, these results confirm the validity of the experimental environment, the functional delivery of the interventions, and the psychological realism necessary for testing self-regulation mechanisms.

5.3 Findings per Hypothesis Dimensions

This section presents the results for the three outcome variables: (1) estimated time spent on the platform and temporal dissociation; (2) perceived control and compulsive urge; and (3) intervention recall and acceptance. These outcomes were measured using a combination of closed-ended response options and 7-point Likert scale items. Results are grouped by experimental condition: Control (*Test 0*), Timer-only warning (*Test A*), and combined Timer with Motivational Prompt warning (*Test B*).

5.3.1 Session Duration and Temporal Dissociation

This subsection reports findings related to the first hypothesis (H1), which predicted that the presence of embedded warnings—either a timer alone (*Test A*) or a timer combined with motivational prompts (*Test B*)—would reduce both the time participants spent watching SFVs and their subjective experience of temporal dissociation during the session. These expectations were grounded in literature on digital self-regulation, which suggests that even low-friction interventions can interrupt immersive user states.

Session duration was measured using predefined 5-minute intervals, including an additional "I am not sure" option. Frequencies of reported durations across groups are shown in Table 5. In the control group (*Test 0*), a larger number of participants reported longer engagement (more than 10 minutes), while responses in *Test A* and *Test B* were mostly within the 5–10-minute range. Five participants in the control group chose the "I am not sure" option, compared to none in the intervention groups. This suggests that the visible timer helped participants more accurately estimate their session duration. To assess whether the overall distributional differences were statistically significant, a Kruskal-Wallis H test was conducted. The result was not statistically significant, $H(2) = 3.40$, $p = 0.183$. This indicates that the variation in reported session durations across

conditions could not be confirmed as reliable. While the descriptive pattern aligns with the hypothesized effect—shorter usage times in the intervention groups— it does not provide statistical support for Hypothesis 1, on the basis of reported duration alone. The result may partly reflect measurement limitations, as the use of ordinal categories and self-reported estimates introduces imprecision relative to continuous time tracking.

Table 5. Frequency and Percentage of Session Duration (Q1)

Session Duration	**Test 0 (Control)**	**Test A (Timer only)**	**Test B (Timer + Prompt)**
Less than 5 minutes	3 (10.3%)	3 (11.5%)	3 (11.1%)
Between 5 and 10 minutes	11 (37.9%)	16 (61.5%)	21 (77.8%)
Between 10 and 15 minutes	5 (17.2%)	7 (26.9%)	3 (11.1%)
Between 15 and 20 minutes	4 (13.8%)	0 (0.0%)	0 (0.0%)
More than 20 minutes	1 (3.4%)	0 (0.0%)	0 (0.0%)
I am not sure	5 (17.2%)	0 (0.0%)	0 (0.0%)

In contrast, clearer group differences emerged in participants' subjective experiences. For Q2, which assessed temporal dissociation, a one-way ANOVA showed a significant effect of condition, $F(2, 79) = 5.82$, $p = 0.004$. Mean scores were highest in the control group ($M = 5.41$, $SD = 1.86$), and lower in *Test A* ($M = 3.96$, $SD = 1.80$) and *Test B* ($M = 3.89$, $SD = 2.01$). Similarly, for Q3, which asked whether participants watched longer than intended, group differences were statistically significant, $F(2, 79) = 19.52$, $p < 0.001$. The control group reported the highest mean ($M = 5.55$, $SD = 1.90$), followed by *Test A* ($M = 3.42$, $SD = 1.63$), and *Test B* ($M = 2.78$, $SD = 1.67$). A summary of these results is provided in Table 6.

Table 6. Means (SD) for Temporal Dissociation Measures (Q2–Q3)

Temporal Dissociation	**Test 0 (Control)**	**Test A (Timer only)**	**Test B (Timer + Prompt)**	**Test-statistic**
Sample size	29	26	27	
Q2. I lost track of time while watching the videos	5.41 (1.86)	3.96 (1.80)	3.89 (2.01)	$F(2, 79) = 5.82$, $p = 0.004$
Q3. I watched for longer than I intended	5.55 (1.90)	3.42 (1.63)	2.78 (1.67)	$F(2, 79) = 19.52$, $p < 0.001$

Overall, while session duration did not differ significantly between groups, the ones with interventions were associated with lower levels of temporal dissociation and perceived overconsumption. The pattern was consistent across both intervention types and most pronounced in the group that received motivational prompts alongside the timer.

5.3.2 Perceived Control and Disengagement Ability

Hypothesis 2 examined whether digital warnings enhanced participants' sense of control and their ability to disengage from the platform. This hypothesis was tested using four survey items, all rated on a 7-point Likert scale. Descriptive statistics for all four items are shown in Table 7.

Table 7. Means (SD) for Perceived Control and Disengagement Measures (Q4–Q7)

Perceived Control and Disengagement	**Test 0 (Control)**	**Test A (Timer only)**	**Test B (Timer + Prompt)**	**Test-statistic**
Sample size	29	26	27	
Q4. I felt in control of my video watching during the session	3.10 (1.50)	5.81 (1.02)	5.81 (1.64)	$F(2, 79) = 34.19$, $p < 0.001$
Q5. I could have stopped watching at any time if I had wanted to	3.66 (1.63)	5.15 (1.59)	5.70 (1.20)	$F(2, 79) = 14.24$, $p < 0.001$
Q6. I felt a strong urge to keep watching, even when I considered stopping	4.45 (1.82)	2.73 (1.43)	2.85 (1.83)	$F(2, 79) = 8.79$, $p < 0.001$
Q7. I kept watching even though I didn't plan to	5.10 (2.02)	2.96 (1.51)	2.81 (2.00)	$F(2, 79) = 13.23$, $p < 0.001$

Across all four items, a consistent pattern emerged. Participants in the control group reported the lowest levels of self-regulation, while both intervention groups (*Test A* and *Test B*) reported more positive outcomes. For the items capturing self-regulatory capacity (Q4, Q5), average scores in the intervention groups were approximately two points higher than in the control condition. ANOVA confirmed the statistical significance of this difference, Q4: $F(2, 79) = 34.19$, $p < 0.001$. Q5 showed a similar trend with a slightly smaller gap, $F(2, 79) = 14.24$, $p < 0.001$. The pattern was mirrored in the items addressing the resistance to disengagement. Participants in the control condition reported higher urges to continue (Q6) and a greater tendency to keep watching despite intention to stop (Q7). These effects were reversed in the intervention groups, who on average reported lower compulsion. The differences were again statistically significant — Q6: $F(2, 79) = 8.79$, $p < 0.001$; Q7: $F(2, 79) = 13.23$, $p < 0.001$.

While the direction of effects was uniform across items, some variation in magnitude was observed. The largest between-group difference appeared in Q4 (perceived control), while Q6 (urge to continue) showed a more moderate shift. Notably, *Test A* and *Test B* produced similar results across all four items, though *Test B* showed slightly higher scores for perceived disengagement (Q5) and slightly lower scores on continued watching (Q7). Together, the data suggest a coherent set of outcomes across distinct but related dimensions of control and disengagement. Participants exposed to either form of intervention consistently rated their ability to regulate usage more positively, and their compulsive tendencies less strongly, than those in the control group.

5.3.3 Message Recall and Acceptance

Hypothesis 3 proposed that participants exposed to the targeted digital warning (*Test B*) would evaluate the intervention more positively than those who received only a simple timer (*Test A*). This hypothesis was assessed through five items: one binary measure of message recall (Q8), and four Likert-scale items evaluating perceived reflection (Q9), supportiveness (Q10), acceptability (Q11), and utility (Q12) of the warnings. Importantly, those items were not presented to the participants in the control group as they didn't have any warnings. Descriptive statistics for all five items are shown in Table 8.

Table 8. Means (SD) for Recall, Perceived Effectiveness, and Acceptance Measures (Q8–Q12)

Recall, Perceived Effectiveness, and Acceptance	**Test A (Timer only)**	**Test B (Timer + Prompt)**	**Test-statistic**
Sample size	26	27	
Q8. Do you remember seeing a message during the session?	88.5%	88.9%	$\chi^2(1) = 0.00$, $p = 1.00$
Q9. The message made me reflect on my usage	5.92 (1.35)	5.96 (1.46)	$F(1, 49) = 0.01$, $p = 0.916$
Q10. The message felt supportive and helpful	3.80 (1.83)	6.15 (0.97)	$F(1, 49) = 33.47$, $p < 0.001$
Q11. I would like to see such reminders in real platforms	6.48 (1.05)	6.35 (1.02)	$F(1, 49) = 0.21$, $p = 0.645$
Q12. These kinds of reminders could help me use social media more intentionally	6.48 (0.92)	6.19 (1.13)	$F(1, 49) = 0.99$, $p = 0.324$

Q8 asked participants whether they remembered seeing a message during the session. Of the 53 participants in the two intervention groups, 47 responded "Yes" and 6 responded "No." Cross-referencing these answers with Q1 (session duration) revealed that all six "No" responses came from participants who had spent less than five minutes on the platform. Since the warning was programmed to appear after five minutes, all participants who stayed long enough to trigger it reported seeing it, demonstrating high recall when exposure occurred.

The following items assessed the subjective evaluation of the message. For Q9, mean ratings were similar in both *Test A* and *Test B*, with no statistically significant difference, $F(1, 49) = 0.01$, $p = 0.916$. This pattern also held for Q11 and Q12. Participants expressed similarly favorable views on whether they would like to see such reminders on real platforms (Q11: $F(1, 49) = 0.21$, $p = 0.645$), and whether such reminders could support more intentional use (Q12: $F(1, 49) = 0.99$, $p = 0.324$). These results suggest a broadly shared level of acceptability and perceived potential for behavioral support across both intervention types.

The clearest distinction between groups emerged for Q10, which asked whether the message felt supportive and helpful. Participants in *Test B*, who received the targeted message with motivational content, rated this item significantly higher than those in *Test A*. The difference was statistically significant, $F(1, 49) = 33.47$, $p < 0.001$. This item was the only one to show a meaningful difference in subjective evaluation between the two

intervention designs. Figure 2 visualizes the average participant ratings across the four evaluation items (Q9–Q12), further highlighting the sharper difference on Q10 between the two interventions.

In sum, while participants across both intervention groups generally rated the message experience positively, only the targeted version in *Test B* was perceived as more supportive. Other measures of reflection, acceptance, and perceived utility remained consistent across conditions. The link between session duration and recall confirms that participants only reported exposure when the system would have actually triggered the message, supporting the reliability of the recall responses.

The following section synthesizes the findings across all three hypotheses.

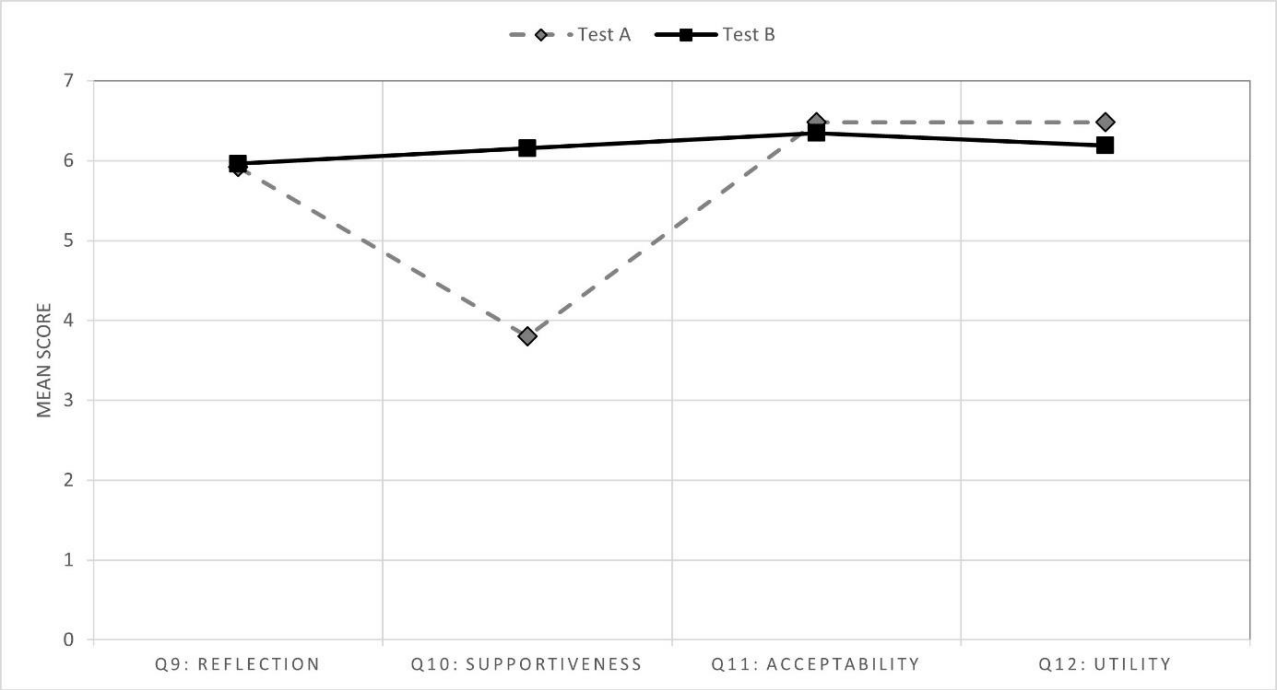


Figure 2. Participant Ratings of Message Effectiveness (Q9–Q12)

5.4 Summary of Main Findings

Across the three hypotheses tested, a consistent pattern of results emerged in favor of the intervention conditions. Although self-reported session duration did not significantly differ between groups (Q1), participants in the intervention groups were more likely to report shorter viewing sessions, and none selected the "I am not sure" option, suggesting improved temporal awareness.

For temporal dissociation and perceived overconsumption (Q2–Q3), significant group differences were observed, with both intervention groups reporting lower levels than the control. These findings suggest that the presence of a digital warning, whether neutral or motivational, may reduce immersive tendencies and excessive consumption.

Perceived control and disengagement ability (Q4–Q7) showed the most robust effects. Participants in both intervention groups consistently reported greater self-regulatory capacity and weaker compulsive tendencies

than those in the control group. All four items showed statistically significant between-group differences, and means consistently favored the intervention conditions.

Regarding message recall and evaluation (Q8–Q12), participants in the intervention groups displayed high recall if they stayed long enough to be exposed. Perceptions of the message were generally positive across both groups, but only the targeted condition (*Test B*) was rated as more supportive and helpful (Q10). Other subjective evaluations (reflection, acceptability, behavioral utility) showed no significant differences.

These findings collectively support the effectiveness of embedded digital warnings in shaping user experience and perceived control during SFV use. Detailed interpretations are developed in the next section.

6 Discussion

The following section discusses and interprets the main findings of our experiment, placing them within a broader context. It compares the outcomes to previous studies and outlines the resulting theoretical and practical implications derived from the analysis.

6.1 Recap of Purpose and Research Gap

This thesis approaches the issue of compulsive digital media use from an Information Systems perspective, focusing on how the design of digital environments influences user behavior and autonomy. A core concern is related to the architecture of these technologies, which, influenced by a strong strategic environment, have been reshaped to maximize user engagement, inevitably altering users' traditional self-regulative functions.
Short-form video (SFV) platforms, such as TikTok, present key features, including an endless scroll feed, algorithmic customizations, and a shortened duration of content, deliberately built to bypass those innate mechanisms. These designs affect the very ability of voluntary disengagement and ground the ideal foundation for the development of addictive patterns. While growing attention has been paid to digital addiction and intervention strategies, there is still a lack of studies investigating concrete implementations of solutions to counter those mechanisms and help users regain a sense of control.
This study therefore addresses that gap by developing and experimentally testing an embedded digital intervention intended to act in real-time response to user consumption. The experiment focused on the evaluation and comparison of two digital warnings, a timer-based and a set of targeted motivational prompts, within a custom-built SFV platform. By focusing on both behavioral and perceptual outcomes, the study contributes to ongoing IS research on user–technology interaction, offering evidence for how digital systems can be made more responsive to user wellbeing.

6.2 Interpretation of Main Findings

This section discusses the results of the study in relation to the initial hypotheses and broader literature. Each subsection addresses a specific set of outcomes, linking observed effects to prior research and theoretical frameworks.

6.2.1 Temporal Dissociation and Overconsumption

Hypothesis 1 predicted that participants exposed to digital warnings (*Test A* and *Test B*) would spend less time watching videos, report lower temporal dissociation and lower perceived overconsumption, compared to the control group. The results partially support this hypothesis and offer valuable insight into how embedded interventions shape user experience.
Participants in the two intervention groups reported significantly lower temporal dissociation and overconsumption compared to the control group. Additionally, no significant difference was found between

these two groups. This confirms that regardless of the type of warning, the presence of such an intervention effectively disrupted the immersive flow and helped prevent overconsumption. These findings are consistent with Zimmermann and Sobolev (2023), who showed that even minor interface friction can reintroduce moments of awareness. From a behavioral design perspective, this highlights that the presence of a warning is more impactful than the specific content it displays.

Focusing now on the actual time spent across groups, no statistically significant differences were observed between the three conditions. However, this can be explained by multiple factors. Importantly, the answers were collected in 5-minute intervals with an additional "I am not sure" option. This structure limited precise measurement but was chosen to allow direct comparison across groups and to identify at which time point participants exited. Given the self-reported nature of this question, it is likely that participants either under- or overestimated their time spent, especially those in the control group who had no timer. This is partially confirmed by the distribution of "I am not sure" responses: five participants in the control group selected this option, while none in the intervention groups did. This further supports the interpretation that the control group experienced greater temporal dissociation and had less awareness of their actual time spent.

Lastly, according to *Flow Theory* (Csikszentmihalyi, 1990), individuals in a state of flow experience a distorted sense of time, often underestimating how long they have been engaged in an activity. In our case, the control group reported significantly higher levels of temporal dissociation, which directly supports the idea that their self-reported time estimates may be less accurate. This aligns with the theory's prediction that deeper immersion impairs time perception. Still, a simple analysis of the response distribution reveals notable insight. In *Test B* and *Test A*, the majority of participants indicated a duration between 5 and 10 minutes, suggesting that many may have exited the platform shortly after the first warning. In contrast, the control group showed a more dispersed pattern, with the largest share of responses above 10 minutes among all three conditions. Although these differences are not statistically significant, they remain consistent with the expected pattern and further support the hypothesis at an indicative level.

Taken together, these findings suggest that embedded digital awareness interventions do influence user behavior in SFV environments. While self-reported session duration did not differ significantly across groups, the consistent reductions in temporal dissociation and perceived overconsumption indicate that such interventions can effectively restore time awareness—a key factor in disrupting addictive viewing patterns.

6.2.2 Perceived Control and Disengagement Ability

Hypothesis 2 suggested that participants exposed to digital warnings would report greater perceived control and an increased ability to disengage from the platform. The results strongly support this. Participants in both intervention groups scored significantly higher on perceived control and experienced lower compulsive urges compared to those in the control group, confirming that the presence of an intervention helped reintroduce self-regulatory capacity.

These results are consistent with prior studies showcasing the importance of interface-level interventions to support self-regulation. Biedermann et al. (2021) argued that even light friction can help the viewer reactivate their regulatory mechanisms. Liu et al. (2023) also emphasize that confronting the user with subtle prompts can trigger the cognitive functions essential for conscious decision-making. In our case, both types of warnings paused the feed and confronted the user with an actual choice: clicking the 'Resume' option to pursue. This creates a moment of intentional disruption designed to encourage more deliberate use.

The four items related to this hypothesis were purposefully split—two framed positively, assessing how users felt about their control, and two framed negatively, capturing any compulsive urges, notably whether they ended up watching longer than intended. This two-dimensional analysis was designed to assess the coherence between participants' perceived control and their actual behavioral impulses: if users truly felt in control, they should not simultaneously report a strong urge to keep watching. In the meantime, this approach allowed us to examine whether perceived control translated into actual resistance to the immersive loop, capturing whether users felt internal conflict between their will and their actions. The findings directly support this logic, with participants in both intervention groups reporting significantly higher perceived control and lower compulsive urges than those in the control group. The pause created by the warnings not only helped users feel more in control but also actually influenced their consumption behavior, fostering more conscious engagement.

Another important point is that, once again, no significant differences emerged between the two intervention groups. Based on insights from the literature, digital warnings tailored to user motivation were expected to create a deeper reflective pause and enhance perceived control. In particular, *Test B* introduced a dual-choice interface, offering both a 'Resume' and a 'Take a break' option. This design was intended to provide users with more freedom and reinforce their sense of autonomy. However, based on our results, it was the presence of a timed interruption and a clear prompt for action that had the strongest impact. The *Fogg Behavior Model* (Fogg, 2009) explains that prompts are most effective when they come at the right moment and are easy to act on. In that sense, the findings support the idea that, the design of the interruption matters less than the timing—it is the moment of pause itself that reactivates awareness and restores control. Nevertheless, as suggested in our literature review, disengagement is closely linked to user profiles and their emotional dependency on the content. While our sample was limited to daily users of SFV platforms, we did not assess whether they were already experiencing addictive patterns or emotional attachment. This could help explain why, in our case, even a simple, well-timed prompt was sufficient to trigger disengagement.

Collectively, these results reinforce the impact of embedded digital interventions on users' self-regulatory capacity. By disrupting the seamless flow of SFVs and prompting intentional decision-making, the warnings helped restore a sense of control and reduced compulsive engagement, two core dynamics often compromised by habitual overuse.

6.2.3 Message Recall and Perception

Hypothesis 3 proposed that the motivational message delivered in *Test B* would be perceived as more useful than the neutral timer used in *Test A*. This hypothesis is supported by participants' responses to the perception items, particularly those measuring whether the warnings made them reflect on their usage and whether they felt supportive.

A positive outcome was the high recall of message exposure. All participants who watched long enough for the warning to be triggered (after five minutes) remembered seeing it. This aligns with our analysis: users noticed the message, and their ability to recall it suggests that it had an impact on their session.

Overall, both interventions were well received. Participants in both *Test A* and *Test B* reported that the warnings helped them reflect on their usage. This reinforces the idea that simply interrupting the immersive experience, even with a neutral timer, is enough to trigger a moment of self-awareness. These results support previous findings (Biedermann et al., 2021) and align with the *Fogg Behavior Model's* emphasis on timely prompts as effective drivers of reflection. Moreover, the intervention was deliberately designed to interrupt the session without triggering a negative emotional rebound. The generally positive reception of the warnings suggests that this goal was achieved and confirms that interface-level interventions can be introduced in emotionally charged environments without causing user rejection.

Where the distinction became more pronounced was in how supportive and helpful the warnings were perceived to be. Participants who received the targeted motivational prompt rated this item significantly higher than those who saw only the timer. This suggests that while both warnings disrupted automatic use and encouraged reflection, the motivationally framed message in *Test B* added a stronger sense of support. It indicates that these messages resonated more closely with users' needs, echoing findings by Olson et al. (2023) and Liu et al. (2023), who showed that tailored and personally relevant digital warnings are more effective when aligned with user motivation.

In summary, while both warnings successfully triggered reflection, by adding motivational framing, *Test B* significantly increased the perceived sense of support. These results partially validate Hypothesis 3, showing that emotional tone shapes how interventions are experienced, even if behavioral outcomes remain similar.

6.2.4 Future Acceptance and Design Implications

Hypothesis 3 also served to examine participants' intent to adopt similar interventions in real usage contexts. Beyond effects on behavior and perception, it was essential to assess the long-term potential of integrating such warnings into actual platforms.

Both intervention groups responded very positively to these items, expressing a high level of acceptability toward such reminders and agreeing that they could help them use social media more intentionally. These findings align with the *Technology Acceptance Model* (Davis, 1989), particularly the dimensions of perceived usefulness and behavioral intention. Regardless of the message framing, users recognized the potential value of the warnings in helping them regain control and moderate their usage. This reinforces the idea that even

minimal but well-designed friction, when accepted by users, can be effective without undermining the user experience.

Importantly, the lack of significant differences between *Test A* and *Test B* in this dimension suggests that acceptability may rely more on the concept of being interrupted than on how that interruption is framed. These findings diverge from the literature that emphasizes personalization as a key factor in effectiveness. In contrast to Olson et al. (2023), who reported stronger responses to tailored digital messages for reducing smartphone use, the present study found no significant behavioral difference between a neutral timer and a targeted motivational warning. This divergence may be explained by contextual factors: whereas Olson et al. examined general mobile overuse, the present experiment targeted a specific platform and consumption pattern. One possible interpretation is that, with the faster pace of content delivery on SFV platforms, users may be more receptive to external interventions that help them regain a sense of control, something they might intuitively recognize as harder to achieve on their own compared to other forms of media.

It is also important to note that participants were only exposed to one type of warning, meaning the comparison reflects how each message was received in isolation rather than indicating a direct preference between the two. Additionally, it is crucial to consider that these self-reported outcomes were collected during a single session in which participants encountered the warning for the first time. While both messages received high ratings for future adoption, it is plausible that extended exposure would reveal a stronger sustained preference for *Test B*, as its motivational framing was perceived as more supportive. This expectation aligns with the principles of the *Technology Acceptance Model* (Davis, 1989), which suggests that perceived usefulness plays a key role in long-term adoption. In that sense, the results do not fully validate Hypothesis 3, which assumed a higher evaluation of the motivational message over the timer. Still, the strong ratings across both groups highlight that users are open to tools that disrupt automatic use, encourage reflection, and restore a sense of control.

In conclusion, the consistently high acceptance levels suggest that such warnings are not only effective but also well-received by users, offering a promising blueprint for interventions that can promote well-being without negatively impacting user experience or satisfaction.

6.3 Contributions and Implications

The present study contributes to both theoretical understanding and practical application in the field of digital self-regulation, with a specific focus on SFV consumption. By embedding behavioral interventions into a simulated SFV environment and testing their impact on user experience and compulsive behavior, the research bridges a critical gap between conceptual models and platform-specific realities. The following sections present how these findings advance theoretical frameworks on digital addiction (DA) and user control, and how they inform actionable strategies for platform design and policy-making.

6.3.1 Theoretical Contribution

This study advances theory in the field of digital self-regulation by adapting behavioral intervention models to the unique structure and psychological dynamics of SFV platforms. Unlike traditional social media or video environments, SFVs combine continuous algorithmic adaptation, immersive interfaces, and high-frequency gratification loops that drastically lower users' self-regulation thresholds (Zhang et al., 2019; Tian, Bi, & Chen, 2023). While previous models such as the Fogg Behavior Model (Fogg, 2009) and Flow Theory (Csikszentmihalyi, 1990) have been applied to digital environments, this research demonstrates their applicability within SFV ecosystems, where structural addictiveness is amplified and sustained by real-time content flow.

By embedding digital awareness interventions directly into an SFV platform, this study addresses a gap highlighted by Valta and Maier (2022), who called for more context-sensitive empirical testing of digital nudges. Prior works have largely examined static interfaces, but few have assessed real-time interventions in high-stimulation platforms. Our findings confirm that timely and minimally invasive interruptions can restore behavioral control even under intense immersion, thereby strengthening the theoretical understanding of when and how friction can counteract compulsive use (Biedermann et al., 2021).

Additionally, the study contributes to the literature on technology addiction by showing that reflective control can be enhanced without necessarily relying on personalization. This contrasts with perspectives such as Olson et al. (2023), who emphasize tailored feedback as the primary mechanism of effectiveness. Our findings suggest that the timing of interruptions and the simplicity of the interface may play a more foundational role in helping users regain control over SFV use. This outcome nuances recent findings on the socio-technical attachment of users in SFV apps (Zhang et al., 2019; Xu, Phan, & Tan, 2022).

Finally, in addition to its conceptual contributions, this study offers a refined methodological lens for assessing digital self-regulation in immersive media contexts. By combining behavioral constructs with psychological self-assessments, the study enables a nuanced understanding of the internal conflict users experience during addictive platform use. This dual-item structure builds on and extends measurement models proposed in the literature (Reinecke et al., 2022), offering a replicable template for future research on compulsive digital behavior.

6.3.2 Practical Contribution

This study provides actionable guidance for the design and implementation of embedded digital interventions aimed at reducing compulsive SFV use. Unlike earlier approaches that targeted broad smartphone or screen usage, our findings are grounded in a realistic replication of an SFV platform, combining autoplay, infinite scroll, audiovisual stimulation, and platform-driven reward loops (Sun et al., 2024; Zhang et al., 2019). The lack of self-regulatory decision points observed in SFV environments (Tian, Bi, & Chen, 2023) highlights the urgency of interventions able to integrate directly into platform dynamics. Our experiment demonstrates that

even minimal, well-timed interruptions can restore temporal awareness, perceived control, and user reflection—core elements toward responsible digital use.

A key practical insight is that the presence of an interruption matters more than its specific framing. Both types of embedded warnings, a neutral timer and a motivational message, were equally effective at disrupting immersive loops and reactivating awareness. This supports earlier suggestions that interface-level friction, even when subtle, can significantly impact user behavior (Biedermann et al., 2021; Liu et al., 2023). Our results suggest that generalized implementation could be effective, even without relying on heavy personalization of the content itself, but rather by focusing on the timing and visibility of such warnings.

Beyond product design, the findings offer direction for public health policy and platform accountability. As noted by Chung and Lee (2022), DA must be tackled not only at the user level but also at the system level through responsible design standards. The acceptability and effectiveness of the tested interventions suggest that regulators could encourage the inclusion of such tools for digital addictive formats. This echo calls by Berthon et al. (2019) for the application of nudging principles in digital policy, as well as Carter and Johnson's (2023) proposal to align platform design with public health objectives. Given the growing concerns around adolescent exposure and DA (Pardhan et al., 2022), SFV platforms represent a clear opportunity for targeted and scalable behavioral safeguards.

Taken together, these practical insights underline the potential for real-world impact through low-friction, scalable interventions. However, the scope and generalizability of these conclusions remain subject to certain limitations, which the following section critically addresses.

7 Limitations and Future Research

7.1 Limitations and Potential Bias

While this study offers valuable insights into embedded digital interventions on short-form video (SFV) platforms, several limitations must be acknowledged.

First, although the experimental environment was carefully designed to replicate key features of SFV platforms such as infinite scroll, autoplay, and audiovisual stimulation, it was still not identical to the native apps participants typically use. Some platform-specific features, including comment sections, likes, or personalized notifications, were intentionally omitted to isolate the immersive content loop. However, these missing elements could influence users' typical engagement patterns. Additionally, because the content algorithm was based on a newly created account, participants did not benefit from the real-time tailoring that usually characterizes addictive SFV consumption. This may have reduced the platform's personal relevance and overall engagement.

Second, despite encouraging participants to interact naturally with the platform, the experimental setting may have influenced behavior. As participants were navigating a new interface and aware that they were part of a study, they were likely in a discovery phase. This may have made them more receptive to the platform's features in general. For those in the intervention groups, this heightened attention could have amplified their reaction to the warning, especially if they were anticipating that something might occur. As a result, their response may have been stronger than what would happen in a more familiar and routine usage context.

Third, the study focused on a single session of platform use. While the results show positive short-term effects, it is unclear whether these effects would persist over repeated exposures. The strong reception of the warnings could, in part, be driven by the novelty effect. Future studies should explore the long-term impact and potential habituation to such interventions.

Lastly, the study relied on self-reported measures to assess perceived control, disengagement ability, and compulsive urges. While these subjective assessments offer important insight into users' internal states, they do not provide exact data on usage time or behavioral outcomes. Objective tracking methods could complement self-reports in future research to improve measurement precision.

7.2 Suggestions for Future Research

Several important directions can extend the current findings and address remaining gaps.

First, future research should aim to replicate this experiment in a longitudinal format to assess whether the observed effects persist over time. The current results reflect a single exposure, which may have been influenced by novelty. It remains unclear whether perceived control, reflection, and reduced compulsive urges would hold with repeated sessions or diminish as users become habituated to the warnings. Additionally, a longitudinal design could reveal whether the reception and acceptance of the uniform timer warning and the

motivationally targeted version remain consistent over time, or if user preferences shift with repeated exposure, potentially providing deeper insight into the role of personalization in intervention effectiveness.

Second, the sample could be diversified to include a wider range of age groups, digital usage profiles, and behavioral tendencies. This would help evaluate the generalizability of the findings and reveal whether certain user characteristics, such as age or gender, influence responsiveness. Additionally, future studies could pre-select participants who exhibit clear signs of compulsive or addictive SFV use. This would help more precisely test the effectiveness of the interventions on individuals most at risk.

Third, future research should implement similar interventions directly within the actual SFV platforms that participants habitually use. This would eliminate potential biases introduced by the experimental setting and enhance ecological validity. Embedding the warnings into familiar environments would also enable access to in-platform behavioral metrics, allowing for more accurate comparisons between perceived experience and actual usage patterns.

Fourth, while this study found no strong behavioral advantage of a personalized message over a neutral timer, it highlighted the importance of prompt timing and visibility. Future designs could explore real-time adaptive interventions that tailor the warning's delivery based on live user behavior. For example, algorithms could detect shifts toward more passive or compulsive usage patterns and deliver timely nudges when regulatory capacity is likely to be lowest.

Finally, additional research should explore how varying the delivery of these formats could affects their perceived helpfulness and behavioral impact. This includes using different message tones, colors, animations, or combining visual with auditory signals. Understanding how the form of the intervention influences engagement may help optimize design strategies for different user types and usage contexts.

Conclusion

The rise of short-form video (SFV) platforms has challenged users' ability to self-regulate, exposing critical flaws in digital interface design. This thesis investigated how embedded digital interventions can support more responsible digital use by addressing compulsive behavior patterns through interface-level friction.

Grounded in Information Systems research, we applied two core approaches to digital intervention: friction awareness, aimed at reducing gratification by breaking immersion and restoring time perception, and tailored behavioral cues, designed to reconnect users with their goals and prompt more conscious engagement. Both interventions were embedded in a custom-built SFV platform and evaluated through experimental testing.

The results show that both interventions were effective and well accepted. They significantly reduced perceived overconsumption and temporal dissociation while enhancing users' perceived control and ability to disengage. Importantly, this was achieved without degrading the user experience, demonstrating that awareness can be reintroduced without compromising usability or enjoyment. While both interventions showed similar behavioral effects, the targeted prompt was perceived as more supportive and useful, suggesting stronger potential for long-term adoption.

This research contributes to the development of more responsible digital systems by showing that simple, well-timed interruptions can restore user awareness without harming the experience. It reinforces the idea that self-regulation must be co-produced by interface design, not left solely to individual responsibility. Additionally, the findings nuance the role of personalization. In the specific context of SFV platforms, timing and visibility of interventions appear to have a greater influence than message tailoring alone.

The study offers a foundation for future research on embedded interventions in immersive digital contexts. It also provides practical insights for designers, developers, and policymakers seeking scalable tools to promote digital well-being, shifting platform design toward user agency over engagement maximization.

References

Ajzen, I. (1991). The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

American Psychiatric Association. (2018). Diagnostic and statistical manual of mental disorders (5th ed., text rev.). https://doi.org/10.1176/appi.books.9780890425787

Backlinko. (2025). TikTok statistics you need to know in 2025. https://backlinko.com/tiktok-users

Bao, W., Liu, H., Zheng, K., Zhang, C., Zhang, S., Yu, E., Ou, W., & Song, Y. (2024). Beyond relevance: Improving user engagement by personalization for short-video search. In Proceedings of the ACM conference (pp. 1–10). https://doi.org/10.48550/arXiv.2409.11281

Berthon, P., Pitt, L., Plangger, K., & Shapiro, D. (2019). Addictive De-Vices: A public policy analysis of sources and solutions to digital addiction. Journal of Public Policy & Marketing, 38(4), 451–468. https://journals.sagepub.com/doi/10.1177/0743915619859852

Biedermann, D., Schneider, J., & Drachsler, H. (2021). Digital self-control interventions for distracting media multitasking: A systematic review. Journal of Computer Assisted Learning, 37(5), 1217–1231. https://doi.org/10.1111/jcal.12581

Carter, W., & Johnson, E. (2023). Legal responses to digital addiction: Regulating online gaming, social media, and virtual reality for public health and safety. Legal Studies in Digital Age, 2(2), 24–36. https://jlsda.com/index.php/lsda/article/view/14

Chen, Y., Li, M., Guo, F., & Wang, X. (2023). The effect of short-form video addiction on users' attention. Behaviour & Information Technology, 42(16), 2893–2910. https://doi.org/10.1080/0144929X.2022.2151512

Chiossi, F., Haliburton, L., Ou, C., Butz, A., & Schmidt, A. (2023). Short-form videos degrade our capacity to retain intentions: Effect of context switching on prospective memory. In Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (pp. 1–14). ACM. https://doi.org/10.1145/3544548.3580778

Chung, S., & Lee, H. K. (2022). Public health approach to problems related to excessive and addictive use of the Internet and digital media. Current Addiction Reports, 10(1), 69–76. https://doi.org/10.1007/s40429-022-00458-z

Csikszentmihalyi, M. (1990). Flow: The psychology of optimal experience. Harper & Row.

Dai, C., Tai, Z., & Ni, S. (2021). Smartphone use and psychological well-being among college students in China: A qualitative assessment. Frontiers in Psychology, 12, Article 708970. https://doi.org/10.3389/fpsyg.2021.708970

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319–340. https://doi.org/10.2307/249008

Domoff, S. E., Borgen, A. L., Foley, R. P., & Maffett, A. (2019). Development and validation of the Problematic Media Use Measure: A parent-report measure of screen media “addiction” in children. Psychology of Popular Media Culture, 8(1), 2–11. https://doi.org/10.1037/ppm0000163

Fogg, B. J. (2009). A behavior model for persuasive design. In Proceedings of the 4th international conference on persuasive technology (pp. 1–7). ACM. https://doi.org/10.1145/1541948.1541999

Fu, S., Cai, Z., Lim, E. T. K., Liu, Y., Tan, C.-W., Lin, Y., & Deng, S. (2023). Unraveling the effects of mobile application usage on users’ health status: Insights from conservation of resources theory. Journal of the Association for Information Systems, 24(2), 452–489. https://doi.org/10.17705/1jais.00808

Gerlach, J. P., & Cenfetelli, R. T. (2020). Constant checking is not addiction: A grounded theory of ITmediated state-tracking. MIS Quarterly, 44(4), 1705–1732. https://doi.org/10.25300/MISQ/2020/15685

Gong, X., Cheung, C. M. K., Zhang, K. Z. K., Chen, C., & Lee, M. K. O. (2021). A dual-identity perspective of obsessive online social gaming. Journal of the Association for Information Systems, 22(5), 1245– 1284. https://doi.org/10.17705/1jais.00693

Grant, J. E., Potenza, M. N., Weinstein, A., & Gorelick, D. A. (2010). Introduction to behavioral addictions. The American Journal of Drug and Alcohol Abuse, 36(5), 233–241. https://doi.org/10.3109/00952990.2010.491884

Gu, Z. (J.), & Zhao, X. (2024). Content length limit: How does it matter for a consumer-to-consumer media platform? Information Systems Research, 35(4), 1785–1801. https://doi.org/10.1287/isre.2022.0595

Haliti-Sylaj, T., & Sadiku, A. (2024). Impact of short reels on attention span and academic performance of undergraduate students. Eurasian Journal of Applied Linguistics, 10(3), 60–68. https://ejal.info/menuscript/index.php/ejal/article/view/865/304

Hyman, S. E., Malenka, R. C., & Nestler, E. J. (2006). Neural mechanisms of addiction: The role of rewardrelated learning and memory. Annual Review of Neuroscience, 29, 565–598. https://doi.org/10.1146/annurev.neuro.29.051605.113009

Ichihashi, S., & Kim, B.-C. (2023). Addictive platforms. Management Science, 69(2), 1127–1145. https://doi.org/10.1287/mnsc.2022.4392

Jackson, S. A., & Eklund, R. C. (2002). Assessing flow in physical activity: The Flow State Scale–2 and Dispositional Flow Scale–2. Journal of Sport and Exercise Psychology, 24(2), 133–150. https://doi.org/10.1123/jsep.24.2.133

Jiang, L., & Yoo, Y. (2024). Adolescents' short-form video addiction and sleep quality: The mediating role of social anxiety. BMC Psychology, 12(369). https://doi.org/10.1186/s40359-024-01865-9

Kang, H., & Lou, C. (2022). AI agency vs. human agency: Understanding human–AI interactions on TikTok and their implications for user engagement. Journal of Computer-Mediated Communication, 27(5), 1–13. https://doi.org/10.1093/jcmc/zmac014

Kane-Gill, S. L., O'Connor, M. F., Rothschild, J. M., Selby, N. M., McLean, B., Bonafide, C. P., Cvach, M. M., Hu, X., Konkani, A., Pelter, M. M., & Winters, B. D. (2017). Technologic distractions (Part 1): Summary of approaches to manage alert quantity with intent to reduce alert fatigue and suggestions for alert fatigue metrics. Critical Care Medicine, 45(9), 1481–1488. https://doi.org/10.1097/CCM.0000000000002580

Karahanna, E., Xu, S. X., Xu, Y., & Zhang, N. (2018). The needs–affordances–features perspective for the use of social media. MIS Quarterly, 42(3), 737–756. https://doi.org/10.25300/MISQ/2018/11492

Kovač, V. B. (2012). The more the 'Merrier': A multi-sourced model of addiction. Addiction Research & Theory, 21(1), 19–32. https://doi.org/10.3109/16066359.2012.691581

Kwon, H. E., So, H., Han, S. P., & Oh, W. (2016). Excessive dependence on mobile social apps: A rational addiction perspective. Information Systems Research, 27(4), 919–939. https://doi.org/10.1287/isre.2016.0658

Lervik-Olsen, L., Fennis, B. M., & Andreassen, T. W. (2024). Compulsive social media use and disconnection anxiety: Predictors and markers of compulsive and addictive social media consumption. In A. Close-Scheinbaum (Ed.), The darker side of social media: Consumer psychology and mental health (2nd ed., pp. 31–49). Routledge. https://doi.org/10.4324/9781003410058-3

Li, Z., Wang, G., & Wang, H. J. (2021). Peer effects in competitive environments: Field experiments on information provision and interventions. MIS Quarterly, 45(1), 163–191. https://doi.org/10.25300/MISQ/2021/16085

Liu, R. (2022). Reasons and countermeasures of short video addiction: A case study of Chinese teenagers. In G. Ali et al. (Eds.), Proceedings of the 6th International Seminar on Education, Management and Social Sciences (ISEMSS 2022) (pp. 2189–2197). Atlantis Press. https://doi.org/10.2991/978-2-494069-31-2_257

Liu, Y., Ni, X., & Niu, G. (2021). Perceived stress and short-form video application addiction: A moderated mediation model. Frontiers in Psychology, 12, Article 747656. https://doi.org/10.3389/fpsyg.2021.747656

Liu, Y. (A.), Jiang, Z. (J.), & Choi, B. C. F. (2023). Pushing yourself harder: The effects of mobile touch modes on users' self-regulation. Information Systems Research, 34(3), 996–1016. https://doi.org/10.1287/isre.2022.1155

Ma, Y., & Hu, Y. (2021). Business model innovation and experimentation in transforming economies: ByteDance and TikTok. Management and Organization Review, 17(2), 382–388. https://doi.org/10.1017/mor.2020.69

Marone, V. (2016). Looping out loud: A multimodal analysis of humour on Vine. European Journal of Humour Research, 4(4), 50–66. https://doi.org/10.7592/EJHR2016.4.4.marone

Meerkerk, G.-J., Van Den Eijnden, R. J. J. M., Vermulst, A. A., & Garretsen, H. F. L. (2009). The Compulsive Internet Use Scale (CIUS): Some psychometric properties. CyberPsychology & Behavior, 12(1), 1–6. https://doi.org/10.1089/cpb.2008.0181

Mejtoft, T., Hale, S., & Söderström, U. (2019). Design friction: How intentionally added friction affect users' level of satisfaction. In Proceedings of the 31st European Conference on Cognitive Ergonomics (ECCE 2019) (pp. 1–4). ACM. https://doi.org/10.1145/3335082.3335106

Olson, J. A., Sandra, D. A., Chmoulevitch, D., Raz, A., & Veissière, S. P. L. (2023). A nudge-based intervention to reduce problematic smartphone use: Randomised controlled trial. International Journal of Mental Health and Addiction, 21, 3842–3864. https://doi.org/10.1007/s11469-022-00826-w

Orford, J. (2001). Addiction as excessive appetite. Addiction, 96(1), 15–31. https://doi.org/10.1046/j.1360-0443.2001.961152.x

Orford, J., Daniels, V., & Somers, M. (1996). Drinking and gambling: A comparison with implications for theories of addiction. Drug and Alcohol Review, 15(1), 47–56.

Pardhan, S., Parkin, J., Trott, M., & Driscoll, R. (2022). Risks of digital screen time and recommendations for mitigating adverse outcomes in children and adolescents. Journal of School Health, 92(8), 765–773. https://doi.org/10.1111/josh.13170

Petry, N. M. (2006). Should the scope of addictive behaviors be broadened to include pathological gambling? Addiction, 101(Suppl 1), 152–160. https://doi.org/10.1111/j.1360-0443.2006.01593.x

Purmehdi, M., Legoux, R., Carrillat, F., & Senecal, S. (2017). The effectiveness of warning labels for consumers: A meta-analytic investigation into their underlying process and

contingencies. Journal of Public Policy & Marketing, 36(1), 36–53. https://doi.org/10.1509/jppm.14.047

Purohit, A. K., Barclay, L., & Holzer, A. (2020). Designing for digital detox: Making social media less addictive with digital nudges. In Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems Extended Abstracts (pp. 1–8). ACM. https://doi.org/10.1145/3334480.3382810

Qin, Y., Omar, B., & Musetti, A. (2022). The addiction behavior of short-form video app TikTok: The information quality and system quality perspective. Frontiers in Psychology, 13, Article 932805. https://doi.org/10.3389/fpsyg.2022.932805

Reinecke, L., Gilbert, A., & Eden, A. (2022). Self-regulation as a key boundary condition in the relationship between social media use and well-being. Current Opinion in Psychology, 45, 101296. https://doi.org/10.1016/j.copsyc.2021.12.008

Robinson, T. E., & Berridge, K. C. (1993). The neural basis of drug craving: An incentive-sensitization theory of addiction. Brain Research Reviews, 18(3), 247–291. https://doi.org/10.1016/0165-0173(93)90013-P

Robinson, T. E., & Berridge, K. C. (2003). Addiction. Annual Review of Psychology, 54, 25–53. https://doi.org/10.1146/annurev.psych.54.101601.145237

Roetzel, P. G., & Fehrenbacher, D. D. (2019). On the role of information overload in information systems (IS) success: Empirical evidence from decision support systems. Proceedings of the 40th International Conference on Information Systems (ICIS), Munich, Germany. https://www.researchgate.net/publication/338084455_On_the_Role_of_Information_Overload_in_Information_Systems_IS_Success_Empirical_Evidence_from_Decision_Support_Systems

Saunders, C., Wiener, M., Klett, S., & Sprenger, S. (2017). The impact of mental representations on ICTrelated overload in the use of mobile phones. Journal of Management Information Systems, 34(3), 803–825. https://doi.org/10.1080/07421222.2017.1373010

Sim, J., Choi, K., Han, S. P., & Cho, D. (2024). In-consumption information cues and online video consumption. MIS Quarterly, 48(2), 645–678. https://doi.org/10.25300/MISQ/2023/17763

Solomon, R. L., & Corbit, J. D. (1974). An opponent-process theory of motivation: I. Temporal dynamics of affect. Psychological Review, 81(2), 119–145. https://doi.org/10.1037/h0036128

Statista. (2023, October). YouTube Shorts total daily views worldwide as of October 2023. https://www.statista.com/statistics/1364763/youtube-shorts-total-daily-views/

Sun, R., Zhang, M. X., Yeh, C., Ung, C. O. L., & Wu, A. M. S. (2024). The metacognitive-motivational links between stress and short-form video addiction. Technology in Society, 77, 102548. https://doi.org/10.1016/j.techsoc.2024.102548

Tao, R., Huang, X., Wang, J., Zhang, H., Zhang, Y., & Li, M. (2010). Proposed diagnostic criteria for internet addiction. Addiction, 105(3), 556–564. https://doi.org/10.1111/j.1360-0443.2009.02828.x

Tian, X., Bi, X., & Chen, H. (2023). How short-form video features influence addiction behavior? Empirical research from the opponent process theory perspective. Information Technology & People, 36(1), 387–408. https://doi.org/10.1108/ITP-04-2020-0186

Turel, O., & Serenko, A. (2012). The benefits and dangers of enjoyment with social networking websites. European Journal of Information Systems, 21(5), 512–528. https://doi.org/10.1057/ejis.2012.1

Turel, O., Serenko, A., & Giles, P. (2011). Integrating technology addiction and use: An empirical investigation of online auction users. MIS Quarterly, 35(4), 1043–1061. https://doi.org/10.2307/41409972

Vaghefi, I., Negoita, B., & Lapointe, L. (2023). The path to hedonic information system use addiction: A process model in the context of social networking sites. Information Systems Research, 34(1), 85–110. https://doi.org/10.1287/isre.2022.1109

Valta, M., & Maier, C. (2022). Digital nudging: A systematic literature review, taxonomy, and future research directions. The DATA BASE for Advances in Information Systems, 56(1), 101–109. https://doi.org/10.1145/3715966.3715973

Van Rooij, A. J., Schoenmakers, T. M., Vermulst, A. A., Van den Eijnden, R. J., & Van de Mheen, D. (2011). Online video game addiction: Identification of addicted adolescent gamers. Addiction, 106(1), 205– 212. https://doi.org/10.1111/j.1360-0443.2010.03104.x

Vance, A., Jenkins, J. L., Anderson, B. B., Bjornn, D. K., & Kirwan, C. B. (2018). Tuning out security warnings: A longitudinal examination of habituation through fMRI, eye tracking, and field experiments. MIS Quarterly, 42(2), 355–380. https://doi.org/10.25300/MISQ/2018/14124

Venkatesh, V., Sykes, T. A., Chan, F. K. Y., Thong, J. Y. L., & Hu, P. J.-H. (2019). Children's Internet addiction, family-to-work conflict, and job outcomes: A study of parent–child dyads. MIS Quarterly, 43(3), 903– 927. https://doi.org/10.25300/MISQ/2019/12338

Wang, C., & Lee, M. K. O. (2020). Why we cannot resist our smartphones: Investigating compulsive use of mobile SNS from a stimulus–response–reinforcement perspective.

Journal of the Association for Information Systems, 21(1), 175–200. https://doi.org/10.17705/1jais.00596

Wohllebe, A., Hübner, D.-S., Radtke, U., & Podruzsik, S. (2021). Mobile apps in retail: Effect of push notification frequency on app user behavior. Innovative Marketing, 17(2), 102–111. https://doi.org/10.21511/im.17(2).2021.10

Xie, J., Xu, X., Zhang, Y., Tan, Y., Wu, D., Shi, M., & Huang, H. (2023). The effect of short-form video addiction on undergraduates' academic procrastination: A moderated mediation model. Frontiers in Psychology, 14, 1298361. https://doi.org/10.3389/fpsyg.2023.1298361

Xu, H., Phan, T. Q., & Tan, B. C. Y. (2022). Why are people addicted to SNS? Understanding the role of SNS characteristics in the formation of SNS addiction. Journal of the Association for Information Systems, 23(3), 806–837. https://doi.org/10.17705/1jais.00735

Yang, L., Yuan, M., Chen, Y., Wang, W., Zhang, Q., & Zeng, J. (2017). Personalized user engagement modeling for mobile videos. Computer Networks, 126, 256–267. https://doi.org/10.1016/j.comnet.2017.07.012

Yue, H., Yang, G., Bao, H., Bao, X., & Zhang, X. (2024). Linking negative cognitive bias to short-form video addiction: The mediating roles of social support and loneliness. Psychology in the Schools, 61(10), 4026–4040. https://doi.org/10.1002/pits.23260

Zannettou, S., Nemeth, O.-N., Ayalon, O., Goetzen, A., Gummadi, K. P., Redmiles, E. M., & Roesner, F. (2024). Analyzing user engagement with TikTok's short format video recommendations using data donations. In Proceedings of the 2024 CHI Conference on Human Factors in Computing Systems (CHI '24). Association for Computing Machinery. https://doi.org/10.1145/3613904.3642433

Zeng, J., Abidin, C., & Schäfer, M. S. (2021). Research perspectives on TikTok and its legacy apps. International Journal of Communication, 15, 3161–3172. https://ijoc.org/index.php/ijoc/article/view/14539

Zhan, J. D., & Chan, H. C. (2012). Government regulation of online game addiction. Communications of the Association for Information Systems, 30, Article 13, 187–198. https://doi.org/10.17705/1CAIS.03013

Zhang, X., Wu, Y., & Liu, S. (2019). Exploring short-form video application addiction: Socio-technical and attachment perspectives. Telematics and Informatics, 42, 101243. https://doi.org/10.1016/j.tele.2019.101243

Zhou, T., Wang, Y., Yan, L. (L.), & Tan, Y. (2023). Spoiled for choice? Personalized recommendation for healthcare decisions: A multiarmed bandit approach. Information Systems Research, 34(4), 1493– 1512. https://doi.org/10.1287/isre.2022.1191

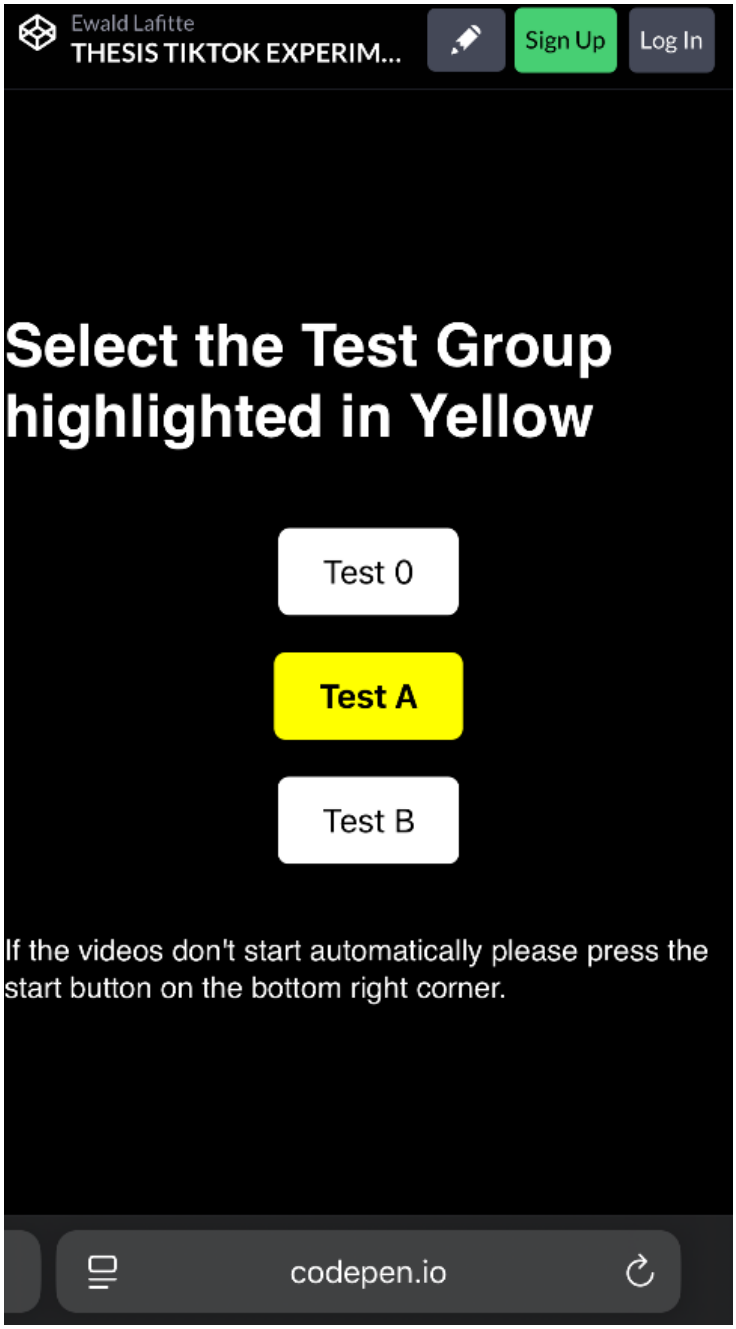
Zhu, C., Jiang, Y., Lei, H., Wang, H., & Zhang, C. (2024). The relationship between short-form video use and depression among Chinese adolescents: Examining the mediating roles of need gratification and short-form video addiction. Heliyon, 10, e30346. https://doi.org/10.1016/j.heliyon.2024.e30346

Zimmermann, L., & Sobolev, M. (2023). Digital strategies for screen time reduction: A randomized field experiment. Cyberpsychology, Behavior, and Social Networking, 26(1), 42–49. https://doi.org/10.1089/cyber.2022.0027

Appendices

Appendix A: Landing Page Interface

Screenshot of the platform's landing page, displaying the experiment instructions and the three test groups. One group is automatically highlighted through the platform's code logic.

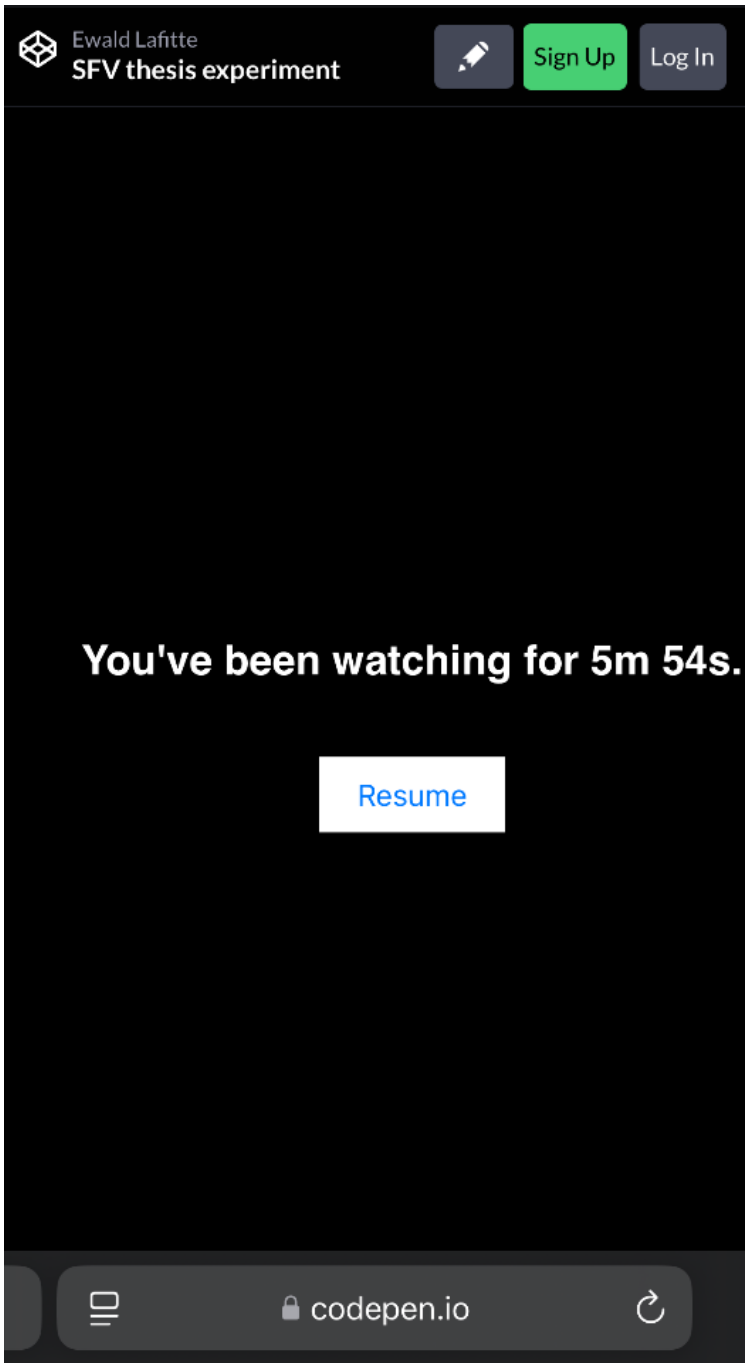


Appendix B: In-Feed Viewing Interface

The video takes up the full screen, with only a pause/resume button in case autoplay does not work.

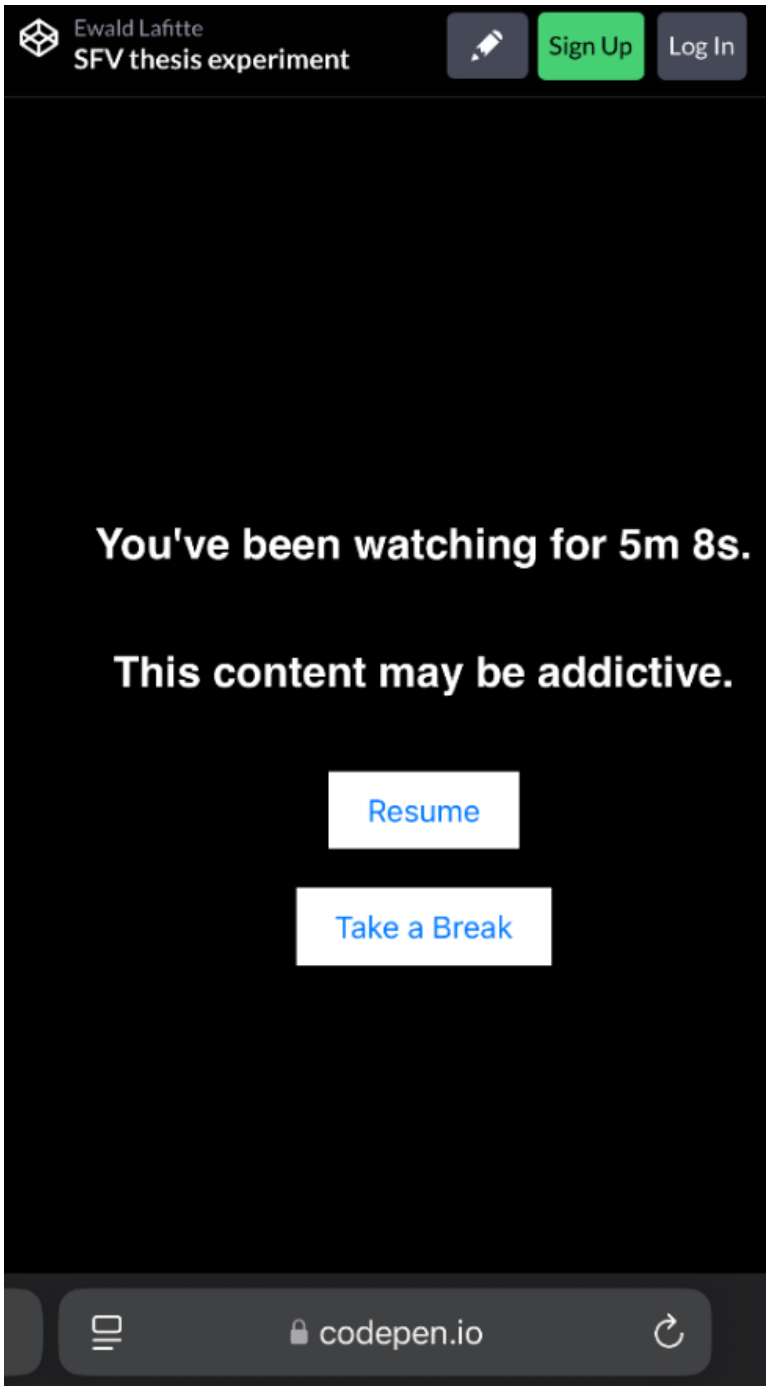
Appendix C: Warning *Test A*

Screenshot of the warning shown to *Test A*. It includes the live timer and the ‘Resume’ button.



Appendix D: Warning *Test B*

Screenshot of the warning shown to *Test B*. It includes one of the six motivational prompts ("This content may be addictive.") and the ‘Take a break’ button, which exits the page when clicked.



Appendix E: AI Usage

This thesis integrated two AI tools to support different stages of the research process. *Elicit* was used at an early stage to assist with literature screening and structuring, helping prioritize readings and shape the initial framework. *ChatGPT* was used more broadly throughout the thesis to enhance consistency, coherence, and academic tone. Its role ranged from refining sentence structure and checking grammar to supporting coding tasks and ensuring alignment between research questions, methods, and conclusions. The following section outlines how those tools were applied across each part of the thesis.

Introduction

ChatGPT was used to improve clarity, fluency, and structure in the abstract, introduction and problem introduction. Self-written drafts were edited using the tool to make sentences more concise and readable, without altering their original meaning. Example prompts included:

"*Can you improve this sentence*: {…}" or "*Make this paragraph more concise*."

Additionally, the tool was used in reverse to assess coherence — by asking what type of experiment could be developed based solely on the introduction, ensuring alignment between the stated problem and the later methodology.

Literature Review

In the early stage, *Elicit* was used to summarize academic articles, helping prioritize which papers to read in full and which to skip. These summaries also guided the initial structure of the literature review by highlighting recurring topics and connections between sources. *ChatGPT* was later used to refine the writing style, identify repetitive formulations, and ensure academic tone. Example prompts included:

"*Can you check this sentence for grammar mistakes*?"

"*Can you make this paragraph more academic*?"

"*Are there repetitions in this section?"*

Finally, to verify coherence, paragraphs were run through *ChatGPT* to generate summaries — helping assess whether the intended idea was clearly communicated, such as: "*Can you summarize this paragraph in one sentence?"*

Methodology

Beyond improving sentence structure and cohesion, *ChatGPT* was used to support the technical implementation of the experiment. The tool helped develop the HTML code for the web-based experiment hosted on *CodePen*, including identifying errors and debugging issues. It was also used to format and embed videos from an external cloud platform. Example prompts included:

"*Can you check this HTML snippet and tell me if there is any syntax error?"*

"*Based on this URL, could you format these other video links?"*

Additionally, once the survey items were finalized, ChatGPT was used to cross-check their alignment with the research questions and hypotheses. This helped ensure that all theoretical dimensions were addressed and that

no key aspect would be left unanswered in the analysis. "*Is there anything here that won't be answerable based on these survey questions?"*

Results

All descriptive and inferential statistics, including means, standard deviations, and ANOVA, were computed using *Excel*. *ChatGPT* was used as a secondary check to verify calculations and flag any inconsistencies or mismatches in reported values. Example prompt:

"Can you check if these means and SDs are correct based on the following data?"

Discussion, Limitations, and Conclusion

ChatGPT was used to ensure clarity, cohesion, and academic tone across the discussion, limitations, and conclusion sections. Additionally, it supported a reflective process by reviewing the context of the experiment and helping identify any overlooked limitations or potential biases. Example prompts included:

"Can you improve the clarity and flow of this paragraph?"

"Based on this experiment description, are there any limitations or biases that may be missing?"