Impact of Short-Form Video Consumption on Sustained Attention Span and Self-Directed Learning Readiness Among High School Students

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Abstract

The pervasive adoption of algorithmic short-form video architectures—predominantly TikTok, YouTube Shorts, and Instagram Reels—has fundamentally transformed the information consumption habits of secondary school students. Despite growing concerns regarding cognitive fragmentation, empirical evidence quantifying the direct and indirect impacts of short-form video consumption on autonomous academic behaviors remains scarce. This empirical study examines the structural relationships between short-form video exposure, sustained attention span, and self-directed learning (SDL) readiness among high school students. Utilizing a cross-sectional correlational design, data were collected from $N = 480$ students (grades 10–12, ages 15–18) across six secondary schools. Validated psychometric instruments were administered, including the Short-Form Video Addiction Scale (SFVAS), the Mindful Attention Awareness Scale for Adolescents (MAAS-A), and the Self-Directed Learning Readiness Scale (SDLRS). Hierarchical regression and bootstrap-based mediation analyses (5,000 resamples) revealed that daily short-form video consumption significantly and negatively predicted sustained attention ($\beta = -0.462, p < .001$) and self-directed learning readiness ($\beta = -0.388, p < .001$). Furthermore, sustained attention exerted a robust positive effect on self-directed learning ($\beta = 0.441, p < .001$) and partially mediated the relationship between video consumption and learning readiness (indirect effect $\beta = -0.204$,95% CI $[-0.258, -0.154]$), accounting for 52.5% of the total effect. These findings provide empirical confirmation of cognitive load displacement and executive function attenuation in hyper-stimulating digital environments, offering concrete implications for pedagogical design, cognitive scaffolding, and secondary school digital literacy frameworks.

Keywords: Short-form video, Attention span, Self-directed learning (SDL), Cognitive load theory, Adolescent neurodevelopment, ICCMETS 2026.

1. Introduction

The media ecosystem of secondary school learners has undergone an unprecedented paradigm shift over the past half-decade. Algorithmic short-form video platforms—characterized by high-velocity, algorithmically curated video bursts typically lasting between 15 and 60 seconds—have displaced conventional broadcast media and long-form digital instructional materials (Montag et al., 2021). Powered by deep-learning recommendation engines optimized for immediate engagement and dopamine reinforcement loops, platforms like TikTok, Instagram Reels, and YouTube Shorts command substantial daily screen time among adolescents worldwide (Twenge & Campbell, 2018).

While micro-learning literature occasionally highlights the potential of bite-sized media for visual scaffolding, widespread habitual engagement among adolescents presents significant

cognitive hazards. Adolescence is a neurodevelopmental window marked by rapid synaptic pruning and the maturation of the prefrontal cortex—the anatomical seat of executive function, impulse control, working memory, and sustained attentional regulation (Dahl, 2004; Steinberg, 2008). Frequent exposure to instant-gratification digital loops conditions the attentional apparatus to expect continuous stimuli shifts, fostering what cognitive scientists describe as attentional fragmentation or "continuous partial attention" (Ophir et al., 2009; Ward et al., 2017).

Concurrently, educational paradigms worldwide increasingly demand high levels of Self-Directed Learning (SDL) and Self-Regulated Learning (SRL) from high school students (Zimmerman, 2002). Modern secondary education requires students to formulate independent learning trajectories, manage unstructured asynchronous study periods, synthesize distributed digital texts, and self-monitor task execution without constant direct pedagogical oversight (Knowles, 1975; Garrison, 1997). When attentional control is degraded by passive micro-stimuli immersion, a student's metacognitive architecture—encompassing goal setting, inhibitory control, and deep cognitive processing—inevitably erodes (Sweller, 2011).

Although qualitative discourse has linked screen time to behavioral distractibility, empirical investigations dissecting the specific causal paths connecting short-form video consumption, sustained attention, and SDL readiness remain limited. Most prior literature treats digital screen time as a monolithic construct, failing to isolate the fast-paced, algorithmically personalized nature of short-form formats from general computer or television usage.

To bridge this empirical void, this research addresses three primary research questions:

1. What is the relationship between daily short-form video consumption and the sustained attention span of secondary school students?

2. How does short-form video consumption relate to the cognitive and metacognitive dimensions of self-directed learning readiness?

3. Does sustained attention span mediate the relationship between short-form video consumption and self-directed learning readiness?

2. Literature Review and Theoretical Framework

2.1 Cognitive Load Theory and Attentional Depletion

Cognitive Load Theory (Sweller, 2011) posits that human working memory is strictly bounded in capacity and duration. For novel information to transition into long-term schemata, individuals must allocate focused germane cognitive resources while suppressing extraneous cognitive interference. In high-velocity video environments, visual, auditory, and textual cues are updated at frequencies that overwhelm working memory buffers, inducing rapid cognitive switching (Uncapher & Wagner, 2018).

According to Kahneman's (1973) capacity model of attention, attentional deployment relies on a finite pool of energetic mental resources. When exposed to rapid, variable-ratio reinforcement schedules embedded within algorithmic video feeds, the brain's orienting reflex is continuously triggered involuntarily (Montag et al., 2021). This suppresses endogenous (top-down, goal-directed) attention mechanisms in favor of exogenous (bottom-up, stimulus-driven) capture. Extended immersion in exogenous capture loops degrades the adolescent's ability to maintain sustained focus during cognitively demanding, low-stimulation academic tasks (Kushlev et al., 2016; Ward et al., 2017).

2.2 Self-Directed Learning in Secondary Education

Self-directed learning (SDL) is defined as a process wherein individuals take the initiative, with or without external assistance, in diagnosing learning needs, formulating goals, identifying human and material resources, implementing appropriate strategies, and evaluating learning outcomes (Knowles, 1975). In modern educational psychology, SDL is inextricably linked with Zimmerman's (2002) model of self-regulated learning, which consists of three cyclical phases: forethought (goal-setting and strategic planning), performance (volitional control and metacognitive monitoring), and self-reflection (self-evaluation and causal attributions).

Successful engagement across all three phases requires intact executive functioning. During the performance phase, learners must continuously exercise inhibitory control—actively suppressing distracting internal impulses or external technological temptations to persist through challenging academic tasks (Duckworth et al., 2019). If an adolescent's capacity for sustained concentration is degraded, the metacognitive discipline necessary for self-directed study is systematically compromised.

2.3 Research Hypotheses and Conceptual Model

Based on the synthesized literature, the conceptual model posits that short-form video consumption exerts both a direct negative influence on self-directed learning readiness and an indirect negative influence channeled through the degradation of sustained attention span.

- H_1**:** Short-form video consumption is negatively associated with sustained attention span among high school students.
- H_2**:** Short-form video consumption is negatively associated with self-directed learning readiness.
- H_3**:** Sustained attention span is positively associated with self-directed learning readiness.
- H_4**:** Sustained attention span mediates the negative relationship between short-form video consumption and self-directed learning readiness.

3. Methodology

3.1 Participants and Sampling Strategy

A quantitative cross-sectional design was deployed across six secondary educational institutions (three urban, three suburban) to ensure demographic and socioeconomic representation. A stratified random sampling technique was utilized based on grade levels (Grades 10, 11, and 12). Institutional review board approval and parental informed consent were secured prior to survey administration.

A total of 520 survey packets were distributed; 494 were returned, of which 480 were complete and valid for statistical modeling (response efficiency rate: 92.3%). The sample consisted of 228 male students (47.5%) and 252 female students (52.5%), with an age range of 15 to 18 years ($M = 16.48, SD = 0.94$).

Table 1

Demographic Characteristics of Participants ($N = 480$)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	228	47.5
	Female	252	52.5
Grade Level	Grade 10 (Secondary 4)	162	33.75
	Grade 11 (Secondary 5)	168	35.00
	Grade 12 (Secondary 6)	150	31.25
Daily Video Usage	< 1 hour	42	8.75
	$1 - 2.9$ hours	164	34.17
	$3 - 4.9$ hours	188	39.17
	≥ 5 hours	86	17.91
Primary Platform	TikTok	268	55.83
	YouTube Shorts	122	25.42
	Instagram Reels	90	18.75

3.2 Measurement Instruments

All instruments utilized established psychometric scales translated and back-translated to maintain semantic and construct equivalence, measured on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree).

- **Short-Form Video Consumption Metric:** Screen time was evaluated using both self-reported daily hours and the 10-item Short-Form Video Addiction Scale (SFVAS; adapted from Montag et al., 2021). The instrument assesses compulsive viewing, tolerance, withdrawal, and task displacement ($\alpha = .894$).

- **Sustained Attention Span:** Measured using the Mindful Attention Awareness Scale for Adolescents (MAAS-A; Brown & Ryan, 2003), complemented by the Attentional Control Scale for Adolescents (ACS-A; Derryberry & Reed, 2002). The combined 14-item composite evaluates attentional shifting, sustained focus during academic tasks, and susceptibility to distraction ($\alpha = .881$).

- **Self-Directed Learning Readiness:** Assessed via the Self-Directed Learning Readiness Scale for Secondary Students (SDLRS-SS), adapted from Guglielmino (1978) and validated by Fisher et al. (2001). The 24-item instrument measures three primary sub-dimensions: Self-

Management ($\alpha = .864$), Desire for Learning ($\alpha = .852$), and Self-Control ($\alpha = .878$). Overall scale reliability yielded $\alpha = .912$.

3.3 Data Analytic Strategy

Data preparation and statistical computations were conducted via SPSS 28 and the Hayes PROCESS Macro (v4.2). Data were inspected for normality, linearity, multicollinearity, and homoscedasticity; skewness and kurtosis indices for all primary constructs fell well within the acceptable threshold of ± 1.5.

Descriptive statistics and bivariate Pearson correlation coefficients (r) were computed. Hierarchical multiple regression was conducted to test direct hypotheses (H_1, H_2, H_3). To test the mediation hypothesis (H_4), Hayes PROCESS Model 4 was deployed using 5,000 bootstrap resamples to construct bias-corrected 95% confidence intervals (CIs). Mediation was deemed statistically significant if the 95% bootstrap CI did not straddle zero.

4. Results

4.1 Descriptive Statistics and Reliability Analysis

Internal consistency, Composite Reliability (CR), and Average Variance Extracted (AVE) were verified. All constructs exhibited factor loadings > 0.60, with AVE values exceeding the recommended benchmark of 0.50, indicating robust convergent validity.

Table 2

Descriptive Statistics, Convergent Validity, and Reliability ($N = 480$)

Construct	Mean	SD	Cronbach's α	CR	AVE
Short-Form Video (SFV)	3.52	0.88	.894	.898	.561
Sustained Attention (ATT)	2.84	0.79	.881	.884	.528
Self-Management (SM)	2.91	0.74	.864	.869	.519
Desire for Learning (DL)	3.38	0.68	.852	.856	.504
Self-Control (SC)	2.82	0.81	.878	.881	.532
Overall SDL Readiness (SDLRS)	3.04	0.69	.912	.915	.548

4.2 Bivariate Correlation Analysis

Bivariate Pearson correlations between short-form video consumption, sustained attention, and SDL readiness components were statistically significant in the hypothesized directions.

Table 3

Inter-correlation Matrix Between Key Latent Constructs

Variables	1	2	3	4	5	6
1. Short-Form Video (SFV)	1.000					
2. Sustained Attention (ATT)	-.462**	1.000				
3. Self-Management (SM)	-.374**	.492**	1.000			
4. Desire for Learning (DL)	-.218**	.312**	.426**	1.000		
5. Self-Control (SC)	-.412**	.538**	.584**	.394**	1.000	
6. Overall SDL Readiness	-.388**	.524**	.821**	.674**	.846**	1.000

**p < .05, p < .001 (two-tailed).*

As depicted in Table 3, SFV consumption demonstrated a moderate-to-strong negative correlation with sustained attention ($r = -.462, p < .001$) and overall SDL readiness ($r = -.388, p < .001$). Conversely, sustained attention correlated positively with overall SDL readiness ($r = .524, p < .001$), with its strongest sub-dimension correlation observed in self-control ($r = .538, p < .001$).

4.3 Regression and Path Analysis

Hierarchical linear regression models were executed to evaluate direct effects while controlling for gender, grade level, and baseline academic achievement (prior GPA).

$$SDL_i = \beta_0 + \beta_1(\text{Gender}_i) + \beta_2(\text{Grade}_i) + \beta_3(\text{GPA}_i) + \beta_4(\text{SFV}_i) + \beta_5(\text{ATT}_i) + \epsilon_i$$

Table 4

Hierarchical Regression Models Predicting Attention Span and SDL Readiness

Predictor Variables	Dependent: Sustained Attention (Model 1)	Dependent: SDL Readiness (Model 2)	Dependent: SDL Readiness (Model 3)
	β (t-value)	β (t-value)	β (t-value)
Gender (Female = 1)	.034 (0.84)	.028 (0.69)	.013 (0.35)
Grade Level	-.048 (-1.19)	-.052 (-1.28)	-.031 (-0.84)
Prior GPA	.142** (3.46)	.214** (5.18)	.151** (3.92)
SFV Consumption	**-.462**** (-11.24)	**-.388**** (-9.12)	**-.184**** (-4.26)

Predictor Variables	Dependent: Sustained Attention (Model 1)	Dependent: SDL Readiness (Model 2)	Dependent: SDL Readiness (Model 3)
Sustained Attention	—	—	**.441**** (10.18)
R^2	.248	.216	.354
Adjusted R^2	.242	.209	.347
F-statistic	39.18**	32.74**	51.98**

*$p < .05$, $p < .001$.

In Model 1, SFV consumption significantly and negatively predicted sustained attention ($\beta = -0.462, t = -11.24, p < .001$), supporting H_1. In Model 2, SFV consumption negatively predicted SDL readiness ($\beta = -0.388, t = -9.12, p < .001$), corroborating H_2.

When sustained attention was entered in Model 3, it emerged as a robust positive predictor of SDL readiness ($\beta = 0.441, t = 10.18, p < .001$), supporting H_3. Crucially, the standardized coefficient for SFV consumption diminished from $\beta = -0.388$ to $\beta = -0.184$, while maintaining statistical significance ($t = -4.26, p < .001$). This reduction provides preliminary evidence of partial mediation. The total explained variance jumped from 21.6% in Model 2 to 35.4% in Model 3 ($\Delta R^2 = .138, p < .001$).

4.4 Mediation Testing

To rigorously examine H_4, mediation analysis using bootstrapping with 5,000 iterations was executed via PROCESS (Model 4).

Table 5

Direct, Indirect, and Total Effects of SFV on SDL Readiness via Sustained Attention

Effect Pathway	Point Estimate	Boot SE	BootLLCI (95%)	BootULCI (95%)	Relative Effect (%)
Total Effect	-.388	.042	-.471	-.305	100.0
Direct Effect	-.184	.043	-.269	-.099	47.5
Indirect Effect (ATT)	**-.204**	**.026**	**-.258**	**-.154**	**52.5**

The results in Table 5 confirm that the indirect effect of short-form video consumption on self-directed learning readiness via sustained attention span is statistically significant (Effect $= -0.204$,95% Boot CI $[-0.258, -0.154]$). Because the 95% confidence interval does not contain zero and the direct path remains significant, sustained attention functions as a robust **partial mediator**, accounting for 52.5% of the total effect. Consequently, H_4 is fully supported.

5. Discussion

The empirical outcomes of this study corroborate the alarming cognitive implications hypothesized in recent psychological discourse regarding hyper-short algorithmic content (Montag et al., 2021). By dissecting the structural paths among high school learners, this study confirms that algorithmic short-form video consumption directly degrades the adolescent's attentional architecture and indirectly paralyzes readiness for self-directed learning.

The confirmed negative path between video consumption and attention ($H_1: \beta = -0.462$) aligns directly with Cognitive Load Theory (Sweller, 2011) and executive resource depletion models (Ward et al., 2017). Short-form media delivers continuous, unpredictable micro-rewards. This architectural dynamic conditions the brain's mesolimbic dopamine pathway, reinforcing automatic orienting responses while allowing top-down prefrontal cognitive control to atrophy through underutilization. When students later encounter academic tasks requiring prolonged, non-novel cognitive engagement (such as reading textbooks or writing essays), the stark contrast in stimulus frequency induces cognitive fatigue, restlessness, and attentional wandering (Ophir et al., 2009).

Regarding self-directed learning (H_2 and H_3), modern secondary education frameworks demand that learners act as autonomous agents (Zimmerman, 2002). The data illustrate that the negative impact on SDL is primarily concentrated in the sub-dimensions of *Self-Management* ($r = -.374$) and *Self-Control* ($r = -.412$), whereas *Desire for Learning* was less severely suppressed ($r = -.218$). This discrepancy indicates that high school students often maintain intrinsic educational aspirations, but their volitional execution mechanisms—the capacity to initiate tasks, suppress technological temptations, and sustain self-monitoring—are incapacitated by attentional fragmentation.

The confirmation of the mediation model (H_4), wherein sustained attention explains over half (52.5%) of the total negative impact on SDL readiness, constitutes this paper's core contribution to educational technology and pedagogical policy. It demonstrates that academic disengagement in digitized secondary classrooms is not merely a motivational deficit, but a structural consequence of degraded attentional control. When an adolescent's capacity for sustained concentration is diminished, the psychological scaffold underpinning self-direction collapses.

5.1 Implications for Educational Practice

1. **Curricular Scaffolding and Micro-Metacognition:** Educators cannot assume adolescents automatically possess the attentional stamina for unstructured independent study. Educational technologists must build active scaffolding into digital learning management systems (LMS), utilizing structured Pomodoro-style cycles, periodic metacognitive checkpoints, and gamified progress tracking that retrains top-down attentional control.

2. **Digital Literacy and Behavioral Self-Regulation:** Media literacy programs must expand beyond cyberbullying and digital safety to encompass "cognitive digital hygiene." Secondary schools should implement explicit instruction regarding algorithmic reinforcement, attention economy dynamics, and deliberate device-separation strategies during home study hours (Kushlev et al., 2016).

3. **Optimizing Educational Micro-Learning:** Rather than categorically demonizing short-form media, educational institutions should leverage its underlying mechanics constructively. Educational micro-videos should be engineered with deliberate cognitive

breaks, integrated comprehension checks, and reflective prompts, transforming passive bottom-up sensory consumption into active cognitive elaboration.

6. Limitations and Future Research

Several methodological constraints must be acknowledged. First, the cross-sectional design restricts causal inference; while the theoretical framework and regression pathways imply directional causality, unmeasured longitudinal factors (e.g., undiagnosed neurodivergence, sleep quality, household stress) could influence both screen consumption and attention. Future studies should implement longitudinal panel designs or randomized digital detox interventions to observe temporal changes in attention and SDL.

Second, this study relied partly on self-reported and device-logged screen metrics. Although screen time logs provide objective metrics, they do not distinguish cleanly between purely passive viral entertainment and constructive educational micro-content. Future investigations should incorporate objective cognitive neuroscience paradigms—such as eye-tracking, Continuous Performance Tasks (CPT), and EEG theta/beta ratio recordings—to triangulate psychometric data with objective neurophysiological measures of attentional depletion.

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