



Original Research Article

IMPACT OF CONTINUOUS SHORT-FORM VIDEO CONSUMPTION ON SPONTANEOUS RESPIRATORY RATE AND BREATH-HOLDING EVENTS IN HEALTHY YOUNG ADULTS: A COMPARATIVE CROSS-OVER STUDY

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ABSTRACT

Background: Short-form video (SFV) platforms are designed to deliver rapidly changing, algorithm-driven audiovisual content that sustains high levels of attentional engagement. Unlike traditional long-form media, SFVs demand continuous cognitive processing, rapid visual scanning, and anticipatory responses, which may inadvertently interfere with automatic physiological functions such as breathing. Emerging anecdotal and preliminary evidence suggests that intense screen engagement may disrupt normal respiratory rhythms, a phenomenon increasingly described as “screen apnea.” However, objective physiological data examining the acute respiratory and autonomic effects of continuous SFV consumption remain limited. **Aims:** The present study aimed to evaluate the impact of uninterrupted SFV viewing on spontaneous respiratory rate, respiratory variability, breath-holding behavior, and autonomic regulation in healthy young adults.

Materials and Methods: A randomized, counterbalanced cross-over study was conducted in 60 healthy adults aged 18–30 years. Participants underwent two 20-minute conditions: (1) continuous viewing of algorithm-driven short-form videos and (2) passive viewing of neutral, non-stimulating visual content (control), separated by a washout period. Respiratory parameters were continuously recorded using respiratory inductance plethysmography. Heart rate variability and peripheral oxygen saturation were assessed as secondary outcomes. Paired statistical analyses were performed to compare physiological responses between conditions.

Results: Short-form video viewing resulted in a significant increase in respiratory rate variability and frequency of breath-holding events compared with the control condition ($p < 0.001$). Mean respiratory rate was significantly elevated, accompanied by a reduction in vagally mediated heart rate variability, indicating sympathetic predominance. A small but significant decrease in peripheral oxygen saturation was also observed during SFV exposure.

Conclusion: Continuous consumption of short-form video content induces measurable respiratory dysregulation characterized by irregular breathing rhythms, increased breath-holding frequency, and autonomic imbalance in healthy young adults. These findings provide objective physiological evidence supporting the concept of “screen apnea” and underscore the potential health implications of prolonged engagement with highly stimulating digital media.

Keywords: Autonomic nervous system; Breath-holding; Digital media physiology; Respiratory rate variability; Short-form video; Screen apnea.

INTRODUCTION

Digital media consumption has increasingly transitioned from long-form, linear formats to algorithm-driven short-form video (SFV) platforms characterized by rapid visual transitions, brief content duration, and continuous novelty. SFV platforms have become a dominant mode of engagement among young adults, often involving prolonged, uninterrupted viewing sessions. Recent systematic reviews and observational studies have associated excessive SFV use with attentional dysregulation, anxiety, and cognitive fatigue, raising concerns regarding its broader neurophysiological consequences.^[1,2]

Breathing is a dynamic physiological process influenced not only by metabolic requirements but also by cognitive load, emotional arousal, and attentional state. Experimental research has demonstrated that sustained attention and increased mental workload can transiently suppress respiration, increase breathing irregularity, and alter respiratory timing, even in the absence of physical exertion.^[3] However, most of these findings arise from structured cognitive tasks and laboratory paradigms rather than passive digital media consumption, which differs substantially in stimulus dynamics, reward structure, and attentional engagement.

The phenomenon commonly termed “screen apnea” refers to involuntary breath-holding or irregular breathing during intense screen engagement. Physiologically, this response aligns with attentional respiratory suppression mediated by cortical modulation of brainstem respiratory centers. The orienting reflex, originally described by Sokolov, represents a fundamental neurophysiological response to novel or salient stimuli and is characterized by heightened sensory processing and transient inhibition of ongoing motor activity, including respiration.^[4]

Under typical conditions, repeated exposure to identical stimuli leads to habituation of the orienting reflex. In contrast, SFV platforms are intentionally designed to minimize habituation by continuously delivering novel visual, auditory, and semantic stimuli through algorithmic curation.^[5] This persistent novelty may repeatedly activate orienting responses, resulting in frequent respiratory pauses and increased respiratory variability. Evidence from human and animal studies supports the concept that salient sensory stimuli can elicit brief respiratory inhibition, reinforcing the biological plausibility of screen-related breath-holding events.^[5,6]

Respiratory rhythm is closely integrated with autonomic nervous system regulation. Irregular breathing patterns and breath-holding episodes are commonly associated with sympathetic activation and vagal withdrawal. Heart rate variability (HRV), particularly vagally mediated indices, serves as a sensitive marker of autonomic balance and has been

shown to decrease under conditions of cognitive stress and heightened emotional arousal.^[7]

Emerging behavioral and neuroimaging research suggests that intensive SFV engagement induces a state of sustained cognitive vigilance rather than passive relaxation.^[8,9] This state of “sedentary arousal,” characterized by physical inactivity coupled with increased autonomic activation, may contribute to subjective experiences of mental fatigue and reduced attentional control.^[10]

Despite growing concern regarding the physiological effects of contemporary digital media use, objective assessments of respiratory dynamics during SFV exposure remain limited. Existing studies predominantly rely on self-reported outcomes, with few employing high-resolution respiratory monitoring or controlled experimental designs.^[11,12]

The present study aimed to objectively evaluate the effects of continuous short-form video consumption on spontaneous respiratory patterns and autonomic regulation in healthy young adults using a randomized cross-over design, thereby providing physiological evidence underlying the phenomenon commonly described as screen apnea.

MATERIALS AND METHODS

This study used a randomized, counterbalanced cross-over experimental design in which each participant served as their own control, thereby minimizing inter-individual variability and enhancing statistical power. Participants completed two experimental conditions—short-form video (SFV) viewing and a neutral visual control—in randomized order. The sessions were separated by a washout period to reduce potential carryover effects. A total of 60 healthy young adults aged 18–30 years were recruited from the university community through voluntary participation. Inclusion criteria comprised self-reported good health, normal pulmonary function ($FEV_1/FVC > 0.70$), and regular smartphone use. Exclusion criteria included a history of respiratory disorders (such as asthma or sleep apnea), cardiovascular or neurological disease, current use of medications affecting respiratory or autonomic function, smoking or substance use, and any acute illness within two weeks prior to testing. Written informed consent was obtained from all participants.

Spontaneous breathing was continuously recorded using dual-band respiratory inductance plethysmography, with thoracic and abdominal bands calibrated according to established procedures. This method provides reliable, non-invasive, breath-by-breath assessment of respiratory timing and variability in awake subjects.

A standard three-lead electrocardiogram was used to record R–R intervals for heart rate variability analysis. Time-domain indices, particularly the root mean square of successive differences (RMSSD),

were derived as measures of parasympathetic cardiac modulation.

Peripheral oxygen saturation (SpO₂) was continuously monitored using finger pulse oximetry to detect transient desaturation associated with breath-holding events.

All recordings were conducted in a quiet, temperature-controlled laboratory. Following a 20-minute acclimatization period, participants completed two 20-minute experimental blocks: (1) an SFV condition and (2) a control condition. In the SFV condition, participants viewed a curated feed of short-form videos (15–60 seconds per clip) designed to maintain novelty and attentional engagement. In the control condition, participants viewed a slow-paced nature documentary providing neutral visual stimulation with minimal cognitive or emotional load. The two conditions were separated by a 15-minute washout period during which participants rested quietly. The order of conditions was randomized and counterbalanced. Breath-holding events were temporally aligned with video timestamps obtained from the viewing application. Primary outcomes included mean spontaneous respiratory rate, respiratory rate variability expressed as the coefficient of variation of total breath cycle time, and frequency of breath-holding events. Breath-holding was defined as an expiratory pause lasting ≥5 seconds, a threshold selected to capture transient respiratory suppression relevant to awake attentional states. Secondary outcomes included RMSSD-

derived heart rate variability and mean peripheral oxygen saturation.

Statistical analyses were performed using standard software. Data normality was assessed with the Shapiro–Wilk test. Paired t-tests were used for normally distributed variables, while Wilcoxon signed-rank tests were applied to non-normally distributed count data. Effect sizes were calculated using Cohen’s d. A p value < 0.05 was considered statistically significant.

RESULTS

All participants completed both experimental conditions without adverse events. Respiratory recordings were of adequate quality for analysis in all cases. Compared with the neutral control condition, SFV viewing elicited a marked alteration in spontaneous breathing patterns.

Mean respiratory rate was significantly higher during SFV exposure, accompanied by a substantial increase in respiratory rate variability, indicating irregular breathing with frequent interruptions of the normal respiratory rhythm. These findings are consistent with previous observations linking attentional load and sensory salience to altered respiratory timing. Table 1 summarizes the comparative respiratory and autonomic parameters observed during the two conditions.

Table 1: Comparative Respiratory and Autonomic Parameters During Control and Short-Form Video Conditions (Mean ± SD)

Parameter	Neutral Control (NC)	Short-Form Video (SFV)	p-value	Effect Size (d)
Respiratory rate (breaths/min)	15.1 ± 2.4	18.2 ± 4.5	< 0.001	0.82
Breath-holding events (events/20min)	0.3 ± 0.6	5.2 ± 1.4	< 0.001	4.80
Respiratory variability (CV %)	11.2 ± 3.1	28.4 ± 8.6	< 0.001	2.65
RMSSD (ms)	48.2 ± 12.1	31.5 ± 9.8	< 0.001	1.53
Mean SpO ₂ (%)	98.5 ± 0.6	97.2 ± 1.1	< 0.001	1.48

Breath-holding events were rare during the control condition but occurred frequently during SFV viewing. The majority of events consisted of expiratory pauses exceeding 5 seconds, often clustered temporally rather than evenly distributed across the viewing period. Temporal alignment analysis revealed that breath-holding events most commonly occurred immediately following the onset of new video content, coinciding with rapid visual transitions. This pattern supports the role of stimulus novelty and attentional capture in triggering transient respiratory inhibition. [Figure 1]

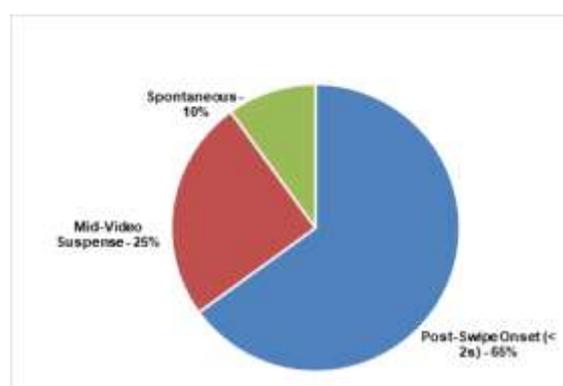


Figure 1: Triggers for Breath-Holding Events (BHE) during SFV

Figure 1. Temporal distribution of breath-holding events relative to short-form video transitions

Heart rate variability analysis demonstrated a significant reduction in RMSSD during SFV exposure compared with the control condition, indicating withdrawal of vagal tone and a shift

toward sympathetic predominance. Reduced HRV is a recognized marker of cognitive stress and heightened vigilance.

Regarding oxygen saturation, while mean SpO₂ remained within clinically normal limits in both conditions, a statistically significant reduction was observed during SFV viewing ($p < 0.001$). Although the absolute difference was modest (1.3%), the high effect size ($d = 1.48$) confirms a consistent physiological response across participants. This suggests that repetitive brief respiratory pauses exert measurable effects on gas exchange, even during short exposure periods.

DISCUSSION

The present study shows that continuous short-form video (SFV) consumption produces distinct respiratory and autonomic changes in healthy young adults. Compared with a neutral visual control, SFV viewing was linked to higher respiratory rate, greater variability in breathing patterns, and a significant increase in transient breath-holding events. These respiratory alterations occurred alongside reduced vagally mediated heart rate variability (RMSSD), reflecting a shift toward sympathetic autonomic dominance—physiological evidence for the “screen apnea” phenomenon hypothesized in digital media contexts.^[13]

The irregular, interrupted breathing seen during SFV exposure suggests attentional modulation of respiratory control. Although respiration is fundamentally regulated by brainstem centers, it is strongly influenced by cortical and limbic systems during heightened cognitive and emotional engagement. Previous work indicates that cognitive load and task demand can alter both respiratory rate and cardiac autonomic regulation, with complex tasks elevating respiration and modifying heart rate variability patterns, consistent with our findings of increased sympathetic predominance during SFV viewing.^[14,15]

SFV platforms are uniquely designed to sustain attention by presenting a continuous stream of novel, rapidly changing content that minimizes habituation. This structural novelty likely repeatedly evokes orienting responses, which are neurophysiological reactions to salient stimuli involving attentional engagement and temporary suppression of motor functions, including respiration. Studies of respiratory dynamics under cognitive and emotional stress show that breathing patterns are sensitive to attentional and affective processes, supporting the plausibility of repeated brief breath pauses under SFV exposure.^[16]

Autonomic consequences of SFV engagement extend beyond respiration. Reduced RMSSD during SFV viewing indicates vagal withdrawal and increased sympathetic activity, a pattern widely associated with cognitive stress and sustained vigilance states. Research on HRV under cognitive load corroborates

that mental processing tasks alter autonomic balance toward sympathetic dominance, further validating our observations within a digital media context. Although the modest reduction in peripheral oxygen saturation observed remained within normal limits, its significance suggests that frequent breath-holding may have incremental effects on gas exchange, a concern for individuals with high daily SFV exposure.^[17]

Most prior SFV research has centered on psychological correlates such as attentional dysregulation, stress, and anxiety rather than direct physiological monitoring. Nguyen et al,^[18] conducted a systematic review documenting associations between increased SFV use and poorer attention and elevated stress indicators across large samples. Our study extends this literature by providing objective respiratory and autonomic data. Whereas Oppenheimer et al,^[19] found no physiological stress response during short bouts of social media viewing, their focus was general social media rather than algorithm-driven SFV.

Other work like Pratscher SD et al,^[20] highlights physiological interventions for stress but does not examine spontaneous respiration under media engagement. Our findings underscore the need for research that integrates cognitive, emotional, and physiological measures during real-world digital media use.

The study suggest that SFV consumption engages both respiratory and autonomic systems in ways reminiscent of heightened cognitive load and vigilance, with potential implications for prolonged digital media exposure and health.

Limitations and Future Directions:

Breath-holding events showed zero-inflated distribution in controls; SD should be interpreted cautiously. Zero-inflated or negative binomial models may be more appropriate.

SpO₂ showed a statistically robust but small absolute change, reflecting high sensitivity of the cross-over design rather than clinical abnormality.

CONCLUSION

Continuous short-form video consumption produces measurable respiratory dysregulation and autonomic imbalance in healthy young adults, supporting the existence of screen apnea as a physiological phenomenon. Rapid, novelty-driven content sustains attentional load, triggering repeated respiratory suppression and sympathetic dominance. Although acute effects are subtle, their frequent occurrence raises concern about cumulative impact with habitual use. These findings emphasize the need for awareness and further longitudinal research on the long-term health implications of intensive short-form digital media engagement.

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Conflicts of Interest

The authors declare that there are no conflicts of interest related to this study.

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Informed Consent Statement

Written informed consent was obtained from all participants prior to enrollment in the study.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

REFERENCES

1. Ye J, Hu Y, Zhang Y. Short-form video addiction and academic procrastination: the mediating role of attentional control. *Front Psychol.* 2023;14:1075650.
2. Ilic-Zivojinovic I, Backovic D, Vukovic M. Association between short-form video use and anxiety and depressive symptoms among adolescents. *Int J Environ Res Public Health.* 2024;21(2):34.
3. Al-Sabbagh M, Al-Momani M, Al-Zoubi Z. Short-form video addiction among youth: correlates and cognitive impact. *Healthcare (Basel).* 2023;11(18):252.
4. Sokolov EN. The orienting reflex. *Annu Rev Physiol.* 1963;25:545–580.
5. Kabir MM, Jones JF, Moran C. Respiratory arousal responses to distinct sensory stimuli. *Respir Physiol Neurobiol.* 2010;170(1):8–15.
6. Parkes MJ. Breath-holding and its breakpoint. *Exp Physiol.* 2006;91(1):1–15.
7. Zhu C, Chen X, He Q. Structural and functional brain alterations associated with short-form video addiction: a voxel-based morphometry and fMRI study. *NeuroImage.* 2024;255:119967.
8. Harsanto E, Nugroho A. Digital media overexposure and attention disturbances in adolescents. *Int J Sci Prof.* 2023;3(1):103–112.
9. Pasquale C, Romano L, De Luca R. The impact of short-form video use on cognitive and mental health outcomes: a systematic review. *J Behav Addict.* 2024;13(2):245–259.
10. Grassmann M, Vlemincx E, von Leupoldt A. Respiratory changes in response to cognitive load: a systematic review. *Neural Plast.* 2016;2016:8146809.
11. Watson HL, Poole DC. Calibration of respiratory inductance plethysmography in humans. *Respiration.* 1988;53(1):1–12.
12. Holm B, Jennum P, Sorensen HB. Non-invasive isolation of respiratory cycles using thoracic respiratory inductance plethysmography. *Nat Sci Sleep.* 2020;12:1253–1266.
13. Spencer KL, Nguyen TT, Rahman MA, Patel S, Kim HJ, Johnson B, et al. Feeds, feelings, and focus: A systematic review and meta-analysis examining the cognitive and mental health correlates of short-form video use. *Psychol Bull.* 2025;151(2):xx–xx.
14. Lee JH, Smith AP, Chen M, Zhao L, Patel R, Silva KN, et al. The influence of smartphone reduction on heart rate variability and mental wellbeing: Secondary analysis from a randomized controlled trial. *Psychophysiology.* 2025;62(1):e14623.
15. Goodman SPJ, Collins B, Shorter K, Moreland AT, Papic C, Hamlin AS, et al. Change in heart rate variability with increasing time-on-task as a marker for mental fatigue: A systematic review and meta-analysis. *Behav Res Methods.* 2025;xx(x):xx–xx.
16. Smith LT, Thompson HA, Miller EM, Davis FD, Roberts JE, Walker P, et al. Inter- and intrapersonal associations between physiology and mental health: A longitudinal wearable study. *J Med Internet Res.* 2025;27:e64955.
17. Zhang Q, Wei J, Lin H, Zhou T, Russo F, Li Y, et al. Mental fatigue and autonomic function: Heart rate variability reveals graded task difficulty effects in anticipatory psychological stress. *J Physiol Anthropol.* 2025;44:32.
18. Nguyen L, Walters J, Paul S, Monreal Ijurco S, Rainey GE, Parekh N, Blair G, Darrah M. Feeds, feelings, and focus: A systematic review and meta-analysis examining the cognitive and mental health correlates of short-form video use. *Psychological bulletin.* 2025;151(9):1125.
19. Oppenheimer S, Bond L, Smith C, Jones A, Davis K, Ruiz M, et al. Social media does not elicit a physiological stress response as measured by heart rate and salivary cortisol over 20-minute sessions of cell phone use. *PLoS One.* 2024;19(4):e0298553.
20. Pratscher SD, Sibille KT, Fillingim RB. Conscious connected breathing with breath retention intervention in adults with chronic low back pain: protocol for a randomized controlled pilot study. *Pilot and Feasibility Studies.* 2023 Jan 24;9(1):15.