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ARTICLE

Potential Effect of Short Video Usage Intensity on Short Video Addiction, Perceived Mood Enhancement ('TikTok Brain'), and Attention Control among Chinese Adolescents

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ABSTRACT: Objectives: Short video addiction has emerged as a significant public health issue in recent years, with a growing trend toward severity. However, research on the causes and impacts of short video addiction remains limited, and understanding of the variable "TikTok brain" is still in its infancy. Therefore, based on the Stimulus-Organism-Behavior-Consequence (SOBC) framework, we proposed six research hypotheses and constructed a model to explore the relationships between short video usage intensity, TikTok brain, short video addiction, and decreased attention control. **Methods:** Given that students are considered a high-risk group for excessive short video use, we collected 1086 valid participants from Chinese student users, including 609 males (56.1%) and 477 females (43.9%), with an average participant age of 19.84 years, to test the hypotheses. **Results:** (1) Short video usage intensity was positively related to short video addiction, TikTok brain, and decreased attention control; (2) TikTok brain was positively related to short video addiction and decreased attention control; and (3) Short video addiction was positively related to decreased attention control. **Conclusions:** These findings suggest that although excessive use of short video applications brings negative consequences, users still spend significant amounts of time on these platforms, indicating a need for strict self-regulation of usage time.

KEYWORDS: Decreased attention control; short video addiction; excessive short video use; stimulus-organism-behavior-consequence (SOBC) framework; TikTok addiction; TikTok brain

1 Introduction

Although short videos are a new form of social media that has only emerged in the past decade, their average monthly usage time now exceeds 22 h per user, surpassing mobile games to become the most time-consuming and fastest-growing sector in the entertainment industry [1]. This rapid growth has raised public concerns about the risks of overuse [2]. In addition to viewing and sharing videos, these apps offer features such as live streaming, shopping, and group chats, making them especially popular among students. However, their immersive nature can lead to problematic usage or even addiction [3]. Shen et al. found that internet addiction is prevalent among Chinese universities [4]. Additionally, Shao et al. reported that the overall detection rate of internet addiction among Chinese university students is 11%, which is higher than in some other countries, highlighting a concerning situation [5]. This is because university students are easily

tempted by the ready availability and instant gratification of online entertainment, leading them to spend excessive time online, and potentially develop addiction [6]. Moreover, with the advancement of mobile internet technology and the widespread use of smartphones, social media has become an integral part of university students' daily lives, making recreational use more likely to result in social media addiction [7]. Short video applications use algorithms to recommend personalized content based on user preferences, making it easy for users to follow specific creators and topics [8]. While these apps enrich users' leisure activities, the algorithmic recommendations can lead to compulsive usage and addiction, earning short videos the monikers "digital fentanyl", "electronic opium", or "digital heroin" [9]. Empirical research on the effects of short video addiction, especially on student populations, remains limited and requires further investigation [3]. Short video addiction negatively impacts students, and studying this phenomenon holds both theoretical and practical significance [10]. Therefore, this study explored the relationship between student users' short video usage and short video addiction.

Short video addiction, also referred to as pathological or excessive short video use, occurs when users fail to regulate their behavior and engage in compulsive viewing [3,10]. Studies have highlighted the importance of short videos in students' daily lives and their irreplaceability, especially among university students, who represent a high-risk group for developing short video addiction [11]. Although short video addiction has attracted increasing public attention, more research is needed to explain its impact, particularly among student users.

The popularity of short videos is growing worldwide, with users spending more time watching them [12]. Apps with autoplay features encourage prolonged usage unless manually stopped, resulting in extended viewing periods [11]. Research indicates that excessive time spent on social media correlates with behavioral problems [13]. Usage intensity is, therefore, a crucial factor in understanding the psychological impact of short video addiction [11]. As the social media landscape evolves, each platform introduces unique features and algorithms that shape how users engage with them [14]. Short videos, often accompanied by lively music, eye-catching text, and engaging visuals, provide a multi-sensory experience that enhances user interaction with the content [9]. These elements bring users joy and satisfaction while reducing negative emotions [1], offering high emotional value. Su et al. conducted fMRI experiments and found that the region containing dopamine neurons (substantia nigra, SN) is significantly activated when watching short videos [15]. This state, which requires continuously obtaining high emotional arousal through short videos, can be referred to as the 'TikTok brain' (perceived mood enhancement) phenomenon. It is a preliminary and unproven hypothetical construct. TikTok brain refers to a psychological or cognitive pattern resulting from prolonged short video consumption, specifically the excessive use of short video platforms such as TikTok. It is used to describe the negative psychological and behavioral traits that result from the overuse of short videos and is considered a more severe manifestation of short video addiction. With each video consumed, the brain experiences a surge of dopamine. This hypothetical variable also aligns with Li et al.'s findings that short videos possess intrinsic rewarding properties, as well as their collective impact on processing visually engaging and emotionally resonant stimuli [16]. In summary, the surge in dopamine is a result of the continuous imagery generated and selected by viewers to obtain rewards from the next video [17]. The negative psychological and neurological impacts of TikTok brain are evident, highlighting the need for greater attention to this issue. However, the negative impacts of new media use on adolescents have not yet been thoroughly examined [18]. Thus, this study took the TikTok brain as a core variable for further exploration.

Research by Brunborg et al. suggested that excessive social media usage can have negative effects [13]. As individuals spend more time multitasking across digital devices, these behaviors not only cause persistent changes but also impair cognitive abilities, an issue of growing importance [19]. Watching short videos can

reduce the cognitive resources allocated by viewers [20], and studies have shown that addicted users are more prone to distraction [21]. These findings highlight the potential cognitive risks associated with short video addiction. Although previous studies on internet and social media addiction have established negative associations between addiction and attention, research focusing specifically on short video addiction and decreased attention control remains limited. This study therefore aimed to further analyze the relationship between short video usage and decreased attention control.

Ye et al. emphasized that the negative impact of short videos on adolescents is still underexplored and requires further investigation [18]. Among various theoretical frameworks, the Stimulus-Organism-Behavior-Consequence (SOBC) framework offers an effective approach to explaining the mechanisms and consequences of addiction. The SOBC framework suggests that specific stimuli (S) affect the internal state of an individual or organism (O), prompting behavioral responses (B) that lead to either positive or negative consequences (C). This framework provides a suitable model for identifying the interactions between environmental stimuli and individual behaviors [22]. Applying the SOBC framework in this study helped clarify the relationship between user behavior and the stimuli presented in short video environments. In summary, this study employed the SOBC framework to examine the relationships between short video usage intensity, TikTok brain, short video addiction, and decreased attention control. Results provide theoretical insights into the impact of short video usage on attention control and its underlying mechanisms, contributing to a better understanding of the factors driving short video addiction and advancing research in this emerging field.

2 Theoretical Foundation, Hypotheses, and Model

2.1 Stimulus-Organism-Behavior-Consequence (SOBC) Framework

The Stimulus-Organism-Behavior-Consequence (SOBC) framework is a model from environmental psychology that helps explain how individuals' behavior is influenced by specific situational factors. This framework evolved from the Stimulus-Organism-Response (SOR) theory, the Antecedent-Behavior-Consequences (ABC) model, and the Behavioral Reasoning Theory (BRT) [23]. The SOBC framework is particularly valuable for understanding the relationships among stimuli, organisms, behaviors, and consequences [24].

Specifically, a stimulus not only includes specific discriminative signals but also encompasses various factors that collectively influence the organism, that is, the cognitive processes of an individual interacting with the environment. These processes, in turn, shape the dynamic relationship between human behavior and the environment. More precisely, behavior manifests as the individual's response to these stimuli or their behavioral patterns. Finally, consequences, as the outcomes of these behaviors, not only reflect the effects of the actions but may also reinforce or motivate the continued development of such behaviors. The SOBC framework thus provides a comprehensive explanation of the complex interactions between the individual (O, B) and the environment (S, C) [25]. In this study, the SOBC framework was employed to explain how the stimuli associated with short video usage affect students' internal states and ultimately result in decreased attention control.

2.2 Research Hypotheses

With the rise of social media, people frequently interact with novel stimuli and social media-related rewards [26]. The functionality of short video platforms enhances user interactions and continuously stimulates psychological states [1]. When users perceive short video content as enjoyable, they are likely to experience subtle feelings of happiness [27]. Reinforcement mechanisms suggest that the more enjoyment

users derive from watching short videos, the more motivated they are to repeatedly engage with the content to maintain positive emotional states [1]. Previous research has shown that social media use triggers dopamine release in the brain, with dopamine being a neurotransmitter associated with pleasure and reward [28]. The design of short video platforms, which recommends content based on user preferences, makes it more likely that dopamine will be released, resulting in mental pleasure. Therefore, it can be inferred that the longer users engage with short videos, the more likely they are to experience the pleasurable effects associated with TikTok brain. Based on this, the following hypothesis was proposed:

Hypothesis 1 (H1): Short video usage intensity is positively related to TikTok brain.

University students tend to have more flexible schedules, abundant free time, and less life pressure, providing them with more opportunities to engage with short videos [29]. Additionally, adolescents are often drawn to engaging video content, leading to frequent interactions with platforms such as TikTok [30]. These students, lacking the ability to resist their impulses, are prone to overusing the platforms, marking the onset of addiction [31]. Previous studies have found that spending excessive time on short videos often results in problematic usage behaviors [32]. These behavior patterns of short video platform use are critical in developing and maintaining addiction to short videos [9]. Thus, it can be inferred that the longer users spend watching short videos, the more likely they are to develop behavioral addiction. Based on this, the following hypothesis was proposed:

Hypothesis 2 (H2): Short video usage intensity is positively related to short video addiction.

Although most users engage with short video applications for entertainment, unrestrained viewing can lead to significant problems for some. For instance, research has shown that problematic TikTok usage is closely related to a lack of self-control [15]. Articles and news reports have also criticized social media for its addictive and distracting nature [33]. Moreover, evidence suggests that both consuming content through social media and using these platforms can alter the brain's cognition, functionality, and structure [26]. Therefore, it can be inferred that the longer users engage with short videos, the more likely it is that their attention control will decline. Based on this, the following hypothesis was proposed:

Hypothesis 3 (H3): Short video usage intensity is positively related to decreased attention control.

In addition to providing an immersive experience, short videos, and live interactions offer users a sense of satisfaction [27]. Some users, unable to resist their desire for instant gratification, gradually develop an addiction to TikTok [31]. This addiction stems from the flow experience that short videos provide, which acts as a psychological reward, encouraging continuous viewing and potentially leading to problematic usage [32]. Thus, it can be inferred that changes in brain activity patterns may result in dependence on and addiction to short video content. Based on this, the following hypothesis was proposed:

Hypothesis 4 (H4): There is a positive relation between TikTok brain and short video addiction.

The relationship between excessive social media use and attention problems has long been a focus of research [34]. Prolonged use of social media can lead to behavioral addiction, and excessive engagement can impair attention [35]. This is because when the brain becomes accustomed to high dopamine levels during relaxation, it requires even more dopamine to achieve the same level of reward [36]. Consequently, extended use of devices causes the brain to release dopamine, resulting in impaired self-control and behavioral changes [37]. This explains why excessive social media users often struggle with distraction [34]. Therefore, when users experience TikTok brain due to prolonged short video consumption, their attention control may be negatively affected. Based on this, the following hypothesis was proposed:

Hypothesis 5 (H5): TikTok brain is positively related to decreased attention control.

The uncontrollable desire to watch short videos, referred to as short video addiction, results in reduced attention or behavioral dysregulation [9]. In the addiction literature, it is well known that individuals with

addictions tend to compulsively seek addictive substances or activities, which impairs other aspects of their lives [36]. Research has shown that addicted users struggle with maintaining attention, as they exhibit more attention deficits while watching short videos, and experience difficulties managing distractions [21]. As short video addiction increases, executive control tends to decline [38]. Additionally, compared to other types of internet addiction, short video addiction poses a higher risk of cognitive impairments due to the design features of these platforms [11]. Thus, the more severe the symptoms of short video addiction, the poorer the user's attention control. Based on this, the following hypothesis was proposed:

Hypothesis 6 (H6): Short video addiction is positively related to decreased attention control.

2.3 Hypothetical Model

From the perspective of the SOBC framework, stimulus (S) refers to the external environment and events encountered by users. Organism (O) represents the user's internal state, including perception, emotions, and thoughts. Behavior (B) refers to the user's behavioral responses to the stimulus, and consequence (C) reflects the outcomes of these behavioral responses. In this study, short video usage intensity is regarded as a stimulus (S) that triggers the user's state of TikTok brain (O). Short video addiction is defined as the behavioral response (B) to the addictive state, while decreased attention control represents the consequence (C) of these behaviors. Fig. 1 presents the hypothetical model of this study.

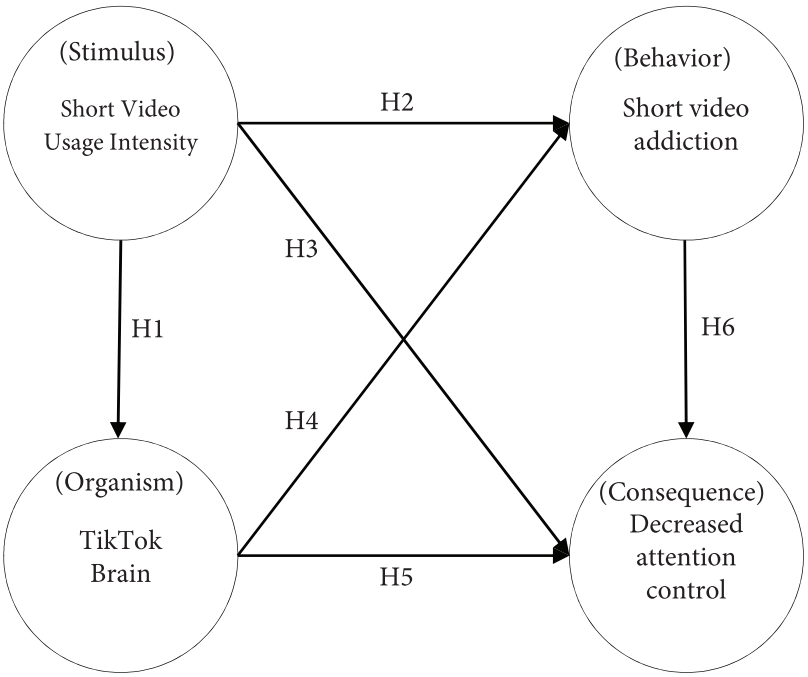

Figure 1: Hypothesis model

3 Method

3.1 Procedure

This study received approval (Approval number: GXUFL-SE-24016) from the Academic Committee of the School of Education, Guangxi University of Foreign Languages where one of the co-authors is employed. Data were collected through an online cross-sectional survey using the Wenjuanxing platform

(https://www.wjx.cn/). In September 2024, we employed snowball sampling and distributed the questionnaire anonymously to Chinese vocational school students who had been long-term users of short video applications. A total of 1086 valid responses were collected, yielding an effective response rate of 97.1%. The reason for selecting this group is that student users with longer usage experience can better reflect the short video usage patterns of this population.

At the beginning of the electronic questionnaire, we included an informed consent statement that outlined the study's purpose, background, research objectives, data usage, and how participant anonymity and privacy would be protected. The statement also provided the contact information of the study's principal investigator. Participants were informed that by participating in the survey, they acknowledged having read and agreed to the informed consent form. They proceeded to the survey by clicking on the statement: "I understand the above information and agree to participate in this study".

3.2 Participants

The participants in this study were Chinese students who had been long-term users of short video applications. The average age of the participants was 19.84 years (SD = 1.34 years). Details regarding gender, education system, school affiliation, average days of use per week, average viewing duration, and primary platforms used are shown in Table 1.

Table 1: Descriptive information

Variables	Details	Percentage
Gender	Male: 609	56.1%
	Female: 477	43.9%
Education level	Higher vocational school: 689	63.4%
	Vocational undergraduate: 397	36.6%
School	Public: 511	47.1%
	Private: 575	52.9%
Average days of use per week	1–3: 44	4.1%
	4–6: 275	25.3%
	Every day: 767	70.6%
Average daily viewing time	<1 h: 63	5.8%
	1–2 h: 601	55.3%
	2–3 h: 303	27.9%
	3–4 h: 77	7.1%
	>4 h: 42	3.9%
Main platforms used	Douyin: 739	68.0%
	Kuaishou: 163	15.0%
	Huoshan: 146	13.5%
	Others: 38	3.5%

3.3 Measurements

This study analyzed self-report data collected using a 5-point Likert scale. To enhance the content validity of the questionnaire, five psychology scholars were invited to participate in a three-round review process to improve the accuracy of the item statements. The first round focused on the alignment of the items with the variables, the completeness of the items, and their readability. The second round emphasized

the revisions to the scale, as well as the completeness and readability of the items. The final round reviewed the revised scale. Detailed descriptions of the relevant scales are provided in Appendix A (Table A1) and the following sections.

3.3.1 Short Video Usage Intensity

Short video usage frequency refers to the average daily time users spend watching short videos. Short video viewing duration reflects the intensity of short video use. This study referred to the criteria used by Yang [31], employing the average daily viewing duration as the measure. The options were further refined into five categories: less than 1 h, 1~2 h, 2~3 h, 3~5 h, and more than 5 h.

3.3.2 Short Video Addiction

Short video addiction refers to the compulsive viewing behavior of short video users who are unable to regulate their actions. This study adopted the Short Video Addiction Scale from Ye et al. [39], which contained 10 items to assess participants' perceptions of addictive behaviors associated with short video usage. An example item is: "I feel down when I don't watch short videos". Higher scores indicate a more severe level of short video addiction. The variable's α was 0.93, the CR value was 0.93, the AVE value was 0.69, and the FL value was 0.83.

3.3.3 Perceived Mood Enhancement ('TikTok Brain')

The term Perceived mood enhancement ('TikTok brain') is used to describe the negative psychological and behavioral characteristics resulting from excessive short video usage. It refers to the psychological or cognitive patterns caused by prolonged and excessive short video viewing. Based on the concept of the TikTok brain, we developed a TikTok Brain scale comprising nine items to measure participants' perceptions of changes in brain states caused by short video consumption. An example item is: "I often need to watch short videos to make me feel happier". Higher scores indicate a more severe manifestation of the TikTok brain. The variable's α was 0.96, the Construct Reliability (CR) value was 0.96, the average variance extracted (AVE) value was 0.79, and the factor loading (FL) value was 0.90.

3.3.4 Decreased Attention Control

Decreased attention control refers to the diminished ability to regulate one's focus after extended overuse of short videos. This study adapted the Decreased Attention Control Scale from Luszczynska et al. [40], which consisted of six items to measure participants' self-perceived attention control after using short videos. An example item is: "Since using short video apps, I often get distracted from what I am doing." Higher scores indicate a greater decline in attention control. The variable's α was 0.97, the CR value was 0.97, the AVE value was 0.89, and the FL value was 0.94.

4 Results

This study employed the AMOS 26 and SPSS 26 statistical software for data analysis. Covariance-based structural equation modeling (CB-SEM) includes a process for assessing the quality of the measurement model, known as confirmatory factor analysis (CFA). CFA involves examining reliability, face, and content validity, convergent and discriminant validity, as well as goodness-of-fit [41]. The detailed methods and results are presented in Sections 4.1–4.4.

4.1 Measurement Model Analysis

The CFA process enables researchers to evaluate multi-item constructs, leading scholars to refer to the confirmation of measurement models as CFA [41]. Thus, the measurement model was analyzed to assess the model fit for TikTok brain, short video addiction, and decreased attention control. Hair et al. defined the following measurement model thresholds: $\chi^2/df < 5$, Root Mean Square Error of Approximation (RMSEA) < 0.10, both Goodness of Fit Index (GFI) and Adjusted Goodness of Fit Index (AGFI) > 0.80, while FL should exceed 0.5 [42]. Table 2 provides a summary of the results.

Table 2: First-order confirmatory factor analysis

Fit Indices	χ^2	*df*	χ^2/df	RMSEA	GFI	AGFI	FL
Threshold value	—	—	<5	<0.10	>0.80	>0.80	>0.50
Short video addiction	41.65	9	4.63	0.06	0.99	0.97	0.81~0.93
TikTok brain	42.88	9	4.76	0.06	0.99	0.97	0.77~0.88
Decreased attention control	2.64	2	1.32	0.02	0.99	0.99	0.91~0.95

Note: χ^2 = Chi-squared, *df* = degree of freedom, χ^2/df, RMSEA = Root Mean Square Error of Approximation, GFI = Goodness of Fit Index, AGFI = Adjusted Goodness of Fit Index, FL = Factor Loading.

Based on the analysis, certain items were removed to improve the model fit: TikTok brain was reduced from nine to six items, short video addiction from 10 to six items, and Decreased attention control from six to four items

4.2 Reliability and Validity Analysis

Regarding the means of the variables, the average score for short video addiction was 3.15 with a standard deviation of 0.77; for TikTok brain, the average was 2.30 with a standard deviation of 0.93; and for decreased attention control, the average was 2.13 with a standard deviation (SD) of 0.96, as shown in Table 3.

Table 3: Analysis of variable means

Construct	Items	M	SD	Min	Max
Short video addiction	6	3.15	0.77	1	5
TikTok brain	6	2.30	0.93	1	5
Decreased attention control	4	2.13	0.96	1	5

4.3 Discriminant Validity Analysis

The Comparison of Average Variance Extracted to Shared Variance (AVE-SV) method is considered a conservative test for discriminant validity. The test confirms that if the square root of the AVE for a given variable is greater than its relation with all other constructs, discriminant validity is established [43], as shown in Table 4.

4.4 Model Fit Analysis

The model fit indices for this study were as follows: $\chi^2 = 254.34$, $df = 114$, $\chi^2/df = 2.23$, Root Mean Square Error of Approximation (RMSEA) = 0.03, Goodness of Fit Index (GFI) = 0.97, Adjusted Goodness of Fit

Index (AGFI) = 0.96, Normed Fit Index (NFI) = 0.99, Non-normed Fit Index (NNFI) = 0.99, Comparative Fit Index (CFI) = 0.99, Incremental Fit Index (IFI) = 0.99, Relative Fit Index (RFI) = 0.98, Parsimonious Normed Fit Index (PNFI) = 0.83, and Parsimonious Goodness of Fit Index (PGFI) = 0.73. Overall, the model fit met the recommended thresholds suggested by Hair et al. [42].

Table 4: Comparison of average variance extracted to shared variance

Construct	1	2	3	4
1. Short video usage intensity	(1)			
2. Short video addiction	0.44	(0.95)		
3. TikTok brain	0.45	0.39	(0.91)	
4. Decreased attention control	0.46	0.37	0.55	(0.97)

Note: The values on the diagonal represent the square roots of the AVE, while the off-diagonal values are relation coefficients.

4.5 Model Validation

The analysis results show that short video usage intensity was positively related with short video addiction (β = 0.46, $p < 0.001$), short video usage intensity was positively related with TikTok brain (β = 0.34, $p < 0.001$), short video usage intensity was positively related with decreased attention control (β = 0.22, $p < 0.001$), TikTok brain was positively related with short video addiction (β = 0.25, $p < 0.001$), TikTok brain was positively related with decreased attention control (β = 0.12, $p < 0.001$), and short video addiction was positively related with decreased attention control (β = 0.43, $p < 0.001$), as shown in Fig. 2. Short video usage intensity explained 21% of the variance in TikTok brain ($f^2 = 0.27$), short video usage intensity and TikTok brain together explained 25% of the variance in short video addiction ($f^2 = 0.33$), while short video usage intensity, short video addiction, and TikTok brain together explained 39% of the variance in decreased attention control ($f^2 = 0.64$), as illustrated in Fig. 2.

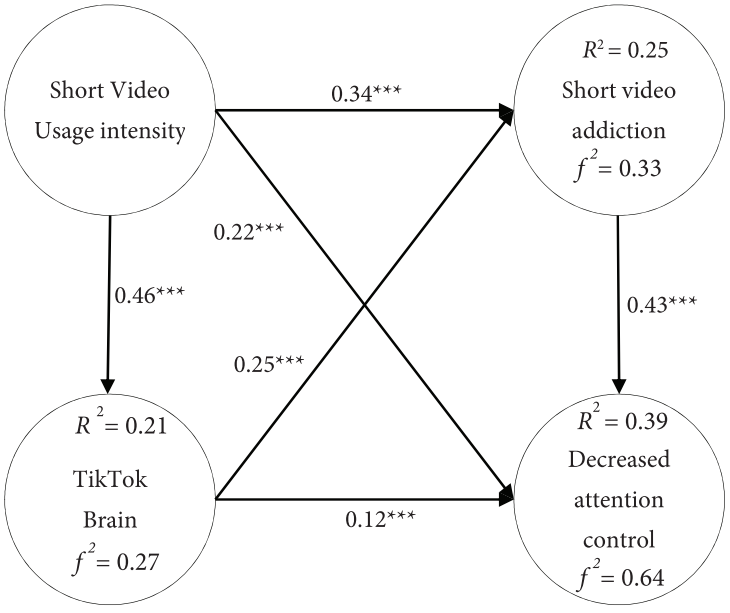

Figure 2: Results model. Note: *** $p < 0.001$

5 Discussion

The study found that the participants' average daily viewing time was predominantly 1 to 2 h (55.3%), with 27.9% watching for 2 to 3 h, 7.1% watching for 3 to 4 h, and 3.9% watching for more than 4 h. This result aligns with Brunborg et al. [13], who found that adolescents spend an average of 2.5 h each day on social media, with about one-third of the sample spending nearly 3 h, demonstrating the reliability of the survey. This result highlights the need to pay close attention to the purposes and motivations of student users when using short videos and to explore effective strategies for preventing excessive engagement in entertainment. In addition, this study investigated the duration of short video usage and related perceptions among Chinese students within the SOBC framework. Path analysis of cross-sectional data collected from 1086 respondents supported all six hypotheses proposed in the study.

5.1 Positive Relationships between Short Video Usage Intensity and TikTok Brain, Short Video Addiction, and Decreased Attention Control

The results showed that short video usage intensity was positively related to TikTok brain and short video addiction. In other words, the longer users spend on short video platforms each day, the more likely they are to develop addiction symptoms and experience dopamine-induced cravings for instant gratification. This finding aligns with Huang et al. [32], who noted that excessive time spent on short videos often results in problematic usage. Students who are unable to resist the temptation of short videos are particularly prone to overuse, marking the onset of addiction [31]. Tian et al. further explained that short videos provide reinforcement mechanisms that increase perceived enjoyment, encouraging users to repeatedly watch videos to maintain a positive emotional state [1].

Additionally, the study indicated a positive relationship between short video usage intensity and decreased attention control, suggesting that the longer students engage with short videos daily, the worse their ability to control their attention becomes. This result echoes Brooks [33], who highlighted the addictive and distracting nature of social media in several articles and news reports. Similarly, Morris et al. pointed out that social media consumption and usage can alter the brain's cognitive functions, structure, and processes [26]. Short video content, being brief, may impair users' attention span, making it challenging for them to concentrate. Therefore, it can be inferred that the longer users spend watching short videos, the more likely they are to develop behavioral addiction and experience the instant gratification associated with the TikTok brain. At the same time, their attention control ability is more likely to decline.

5.2 Positive Relationships between TikTok Brain, Short Video Addiction, and Decreased Attention Control

The analysis revealed that TikTok brain was positively related to short video addiction. In other words, as users become TikTok brain, their brains increasingly rely on dopamine to achieve satisfaction, prompting them to seek fragmented and transient video content, which leads to the development of short video addiction. This result aligns with Nong et al. [27], who noted that short videos provide not only immersion but also abundant satisfaction through interactions with videos and live streams. Yang emphasized that any form of addiction brings instant gratification, driven by dopamine, making it difficult for addicts to quit [31]. This indicates that the mechanisms and entertaining content of short videos act as powerful addictive agents, necessitating precautions to prevent users from becoming overly reliant on or immersed in the gratification they provide.

The study showed that TikTok brain was positively related to decreased attention control. Users with TikTok brains tend to be interested only in activities that provide instant gratification, making it challenging for them to concentrate or engage in deep thinking for extended periods. Manfredini suggested that when people's relaxed state consistently involves high dopamine levels, their brains adapt to this as the new normal,

requiring additional dopamine to achieve a reward state [34]. As a result, users with TikTok brains become interested only in activities that offer instant satisfaction, making it difficult for them to focus for long periods, leading to prevalent distraction [34]. This also explains why prolonged social media use can lead to behavioral addiction, which in turn impairs attention through over-engagement [35]. Overall, when users develop a TikTok brain as a result of extended short video viewing, their attention control is likely to be negatively affected. This finding is consistent with previous research outcomes.

5.3 Positive Relationship between Short Video Addiction and Decreased Attention Control

The study also found that short video addiction is positively related to decreased attention control, indicating that users who develop addiction symptoms are more likely to experience distraction and difficulty focusing. This finding aligns with Yan et al. [38], who found that an increase in short video addiction tendencies negatively affects self-control and weakens executive functions related to attention. Similarly, Liao and Chen et al. highlighted that addicted users struggle to maintain attention, as they experience more attention deficits while watching short videos [9,21]. Thus, the more severe the symptoms of short video addiction, the greater the likelihood of changes in brain activity patterns (i.e., TikTok brain), as well as a further decline in users' attention control ability.

5.4 Implications

The results show that short video usage intensity is an important antecedent. Excessive use increases the likelihood of developing TikTok brain and short video addiction, and may also impair attention control. Therefore, parents and teachers should focus on fostering students' self-regulation skills, helping them manage their time effectively, and restraining their use of leisure applications, as this is the best way to prevent short video addiction. Furthermore, while short video content is highly entertaining, it also contains educational material. If student users can balance their content consumption, the risk of addiction may be reduced.

Additionally, the established link between TikTok brain and short video addiction helps broaden our understanding of the potential harm associated with excessive short video usage. It also highlights the need to pay more attention to the influence of platform mechanisms and content. Although social media addiction, including short video overuse, has not yet been officially recognized as a clinical disorder by international organizations, the potential harm associated with emerging social media platforms warrants greater global attention. There is even a need to consider classifying it as a clinical disorder to raise awareness of this global public health issue. The cognitive impairments and processing difficulties experienced by users with TikTok brain also call for serious attention and the development of intervention strategies.

The SOBC framework, a conceptual model used in psychology and behavioral science, describes the relationships between environmental stimuli, individual characteristics, behavioral responses, and behavioral outcomes. While the SOBC framework has primarily been applied in consumer behavior research to explore purchase intentions and influencing factors, this study is among the few that have used the framework to explain addiction. It is also the first study to apply this framework to examine short video addiction. By constructing a hypothetical model to address existing research gaps, this study offers deeper insights into behavioral addiction and advances our understanding of short video addiction.

5.5 Limitations and Future Research

Although this study confirms the negative effects associated with frequent use of short video platforms, there are several limitations. First, while the study identified a relationship between the duration of short video usage, addiction to short videos, and the phenomenon of TikTok brain, along with decreased attention

control, the cross-sectional design of the research prevents the establishment of causal relationships between the variables. To confirm causality, experimental designs or longitudinal data are required. Of course, the use of the snowball sampling technique limits the breadth and randomness of the sample to some extent, which may affect its external validity. Future studies could adopt probabilistic sampling techniques to address this issue. Additionally, this study's classification method, which used "over 4 h" as the upper limit, may not fully capture higher usage patterns. Future research could consider using continuous or expanded categories to better differentiate heavy users.

Second, a unidimensional Perceived mood enhancement ('TikTok brain') scale was developed in this study, with a particular focus on the characteristics of users' craving for dopamine within the TikTok brain construct. Although this contributes to the theoretical understanding of this emerging variable, objective measurements of the TikTok brain remain equally important. Future research could incorporate physiological and behavioral indicators, or develop multidimensional scales to better assess and evaluate users' TikTok brain states. Additionally, while this study has identified a correlation between TikTok brain and addiction, there may be some mediating variables that contribute to the development of addiction between the two. This includes the lack of measured self-control to confirm the mediating relationship between them.

Third, the mechanisms behind the development and impact of TikTok brain and short video addiction are still not well understood. Future studies could continue to explore how the TikTok brain and short video addiction affect cognitive abilities (such as reduced attention), thinking patterns, learning processes/outcomes, response capabilities, mental health issues, and their impacts on daily life. Additionally, it is crucial to investigate how to effectively prevent short video addiction or mitigate the harmful effects of excessive or inappropriate use, making the study of prevention mechanisms, interventions, and strategies a key area for future research.

Fourth, an emerging trend of addiction is live-streaming addiction. As live streaming becomes a central feature on many social media platforms (such as BiliBili, Facebook, Instagram, Threads, TikTok, Xiaohongshu, etc.), it provides users with multidimensional experiential value, including interactivity, emotional engagement, entertainment, practicality, and convenience. Under the influence of algorithms and account tracking systems, users are more easily exposed to real-time information and continuous streams of new live content, leading many to extend their viewing time and frequency. This emerging phenomenon warrants attention from the academic community. Furthermore, the large amount of traffic generated by live streaming has raised numerous issues that need further exploration, such as tipping culture, impulsive spending, emotional spending, and the shaping of distorted values.

Lastly, internet algorithms are considered key factors influencing behavior and contributing to addiction. However, social science research has rarely focused on algorithm-based inquiries, leaving a gap in understanding their effects. Future research should also consider exploring the mechanisms and impacts of algorithms.

6 Conclusion

Short video addiction is a specific type of internet addiction that has become a major issue among today's youth. This study, using the SOBC framework, explores the relationships between short video usage intensity, TikTok brain, short video addiction, and decreased attention control. The results revealed that: (1) Short video usage intensity is positively related to short video addiction, TikTok brain, and decreased attention control; (2) TikTok brain was positively related to short video addiction and decreased attention control; and (3) Short video addiction was positively related with decreased attention control. These findings suggest that

although excessive use of short video applications brings negative consequences, users still spend significant amounts of time on these platforms, indicating a need for strict self-regulation of usage time.

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Informed Consent: All participants were informed that the survey was voluntary and anonymous before filling in the questionnaire. They were told they could quit at any time. All the students responded by volunteering to participate in the survey.

Conflicts of Interest: The authors declare no conflicts of interest to report regarding the present study.

Appendix A

Table A1: Measurements

No.	Items
	Perceived mood enhancement ('Tiktok Brian')
1	I often need to watch short videos to make me feel happier.
2	I often need to watch short videos to forget my troubles.
3	I often need to watch short videos to ease my anxiety.
4	I often need to watch short videos to immerse myself in them.
5	I often need to watch short videos to feel more energized.
6	I often need to watch short videos to feel joy and excitement.
7	I often need to watch short videos to experience quick satisfaction.
8	I often need to watch short videos to gain a sense of happiness.
9	I often need to watch short videos to feel a heightened emotional state.
	Short video addiction
1	I watch short videos longer than I originally intended.
2	I neglect tasks or responsibilities to spend time watching short videos.
3	The excitement or anticipation of watching short videos outweighs my interest in other social interactions.
4	I have been complained about or criticized by others due to my short video usage.
5	I have been late, left early, or missed school because of watching short videos.

(Continued)

Table A1 (continued)

No.	Items
6	My academic performance has declined due to watching short videos.
7	I get upset when someone interrupts me while I'm watching short videos.
8	I sacrifice my sleep at night to watch short videos.
9	Even after closing the platform, I can't stop thinking about the short video content.
10	I feel down when I don't watch short videos.
	Decreased attention control
1	Since using short video apps, I find it hard to focus on one activity for a long time.
2	Since using short video apps, it often takes me some time to refocus my attention.
3	Since using short video apps, I find it difficult to calm myself down.
4	Since using short video apps, I struggle to concentrate on my goals.
5	Since using short video apps, I often get distracted from what I am doing.
6	Since using short video apps, I find it hard to regain focus after being interrupted.

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