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Problematic TikTok Use Severity, Self-Control, and School Engagement: A One-Year Longitudinal Study

Qingqi Liu^{1,2}, Chenyan Zhang³, Ziyang Yang^{2,4}, & Xiaopan Xu⁵

¹ Department of Psychology, Faculty of Arts and Sciences, Beijing Normal University at Zhuhai, Zhuhai, China

² College of Education for the Future, Beijing Normal University at Zhuhai, Zhuhai, China

³ Department of Neurology, Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China

⁴ Education Development Foundation, Beijing Normal University at Zhuhai, Zhuhai, China

⁵ Institute for Public Policy and Social Management Innovation, College of Political Science and Public Administration, Henan Normal University, Xinxiang, China

Abstract

As short-form video applications such as TikTok have gained popularity, the phenomenon of problematic short-form video usage has emerged as a significant area of research. However, the impact of problematic TikTok use severity on young people's school engagement, as well as the underlying mechanisms of this impact, has yet to be rigorously explored through empirical studies. The present study employed a one-year longitudinal design (with data collection occurring at three time points, spaced six months apart) at two universities located in South China. A total of 590 university students, aged 17 to 24 years, completed scales designed to assess the severity of problematic TikTok usage, usage patterns, self-control, and school engagement and to collect demographic information. Correlational analysis revealed a positive correlation between self-control at time point 2 (T2) and school engagement at time point 3 (T3), whereas both variables exhibited negative correlations with problematic TikTok use severity at time point 1 (T1). Furthermore, regression analysis demonstrated that, after controlling for age, TikTok use time, and school engagement at T1, self-control at T2 played a mediating role in the association between problematic TikTok use severity at T1 and school engagement at T3. Additionally, both gender and TikTok use patterns played a significant moderating role in the mediating effect of self-control. The indirect effect of self-control was observed to be substantial only among male university students. In addition, this indirect effect was more pronounced among university students who passively use TikTok than among those who actively use TikTok. These findings enhance our understanding of both the direct and indirect effects of the severity of problematic TikTok use and the potential moderating factors influencing the relationship between problematic TikTok use severity and school engagement. Additionally, our research offers valuable practical insights into the responsible use of short-form video applications such as TikTok and suggests strategies for effectively mitigating the negative impacts of problematic TikTok usage on school engagement.

Keywords: problematic TikTok use severity; self-control; school engagement; gender differences; TikTok use patterns; longitudinal study

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Introduction

The widespread utilization of short-form video applications (apps) has become increasingly prevalent because of the proliferation of mobile internet technology, establishing them as among the most popular online apps (N. Zhang et al., 2023). TikTok, also known as Douyin in China, is a typical short-form video app and has become one of the most popular mobile apps worldwide. A recent survey revealed that TikTok users spend an average of 95 minutes per day on the app, with the average user opening TikTok 19 times per day (Aslam, 2024). The types of use of short-form video applications can be primarily divided into two types: active use, which includes uploading or sharing short-form videos, and passive use, which involves browsing and watching short-form videos (Pan et al., 2023). The convenience of short-form video applications for creating and sharing personal experiences, coupled with the wide range of diverse and captivating content available, has led to an increasing tendency for individuals to be attracted and addicted to immersing themselves in these platforms. The problematic use of short-form video apps such as TikTok has emerged as a significant behavioral concern (Q.-Q. Liu et al., 2022; Sabir et al., 2020; Smith & Short, 2022).

Some researchers posit that problematic short-form video use constitutes a novel form of problematic internet use, one that is markedly distinct from recognized issues such as gaming disorder, problematic social media use, and excessive information acquisition behaviours (Q.-Q. Liu et al., 2022; Tu et al., 2023). Conversely, some scholars argue that problematic use of short-form video applications constitutes a distinct subtype of problematic social media use owing to the unique social features inherent in these platforms, differentiating it from traditional forms of problematic social media use, such as those associated with Facebook (Chao et al., 2023; Smith & Short, 2022). Owing to variations in research participants and measurement instruments, scholars have reported differing rates of problematic TikTok use. For example, Smith and Short (2022) reported a prevalence rate of 8.7% for problematic TikTok use, whereas Chao et al. (2023) reported that 34.2% of participants were classified as problematic users. Additionally, Galanis et al. (2024) reported a TikTok use disorder prevalence of 7.7%. Meta-analyses on social media usage indicate that the prevalence of problematic social media use is significantly greater in collectivist cultures, particularly in Asian regions, than in individualistic cultures, such as those in Europe and the Americas (C. Cheng et al., 2021; Salari et al., 2025). In Asia, the rates of problematic social media use exceed 20% (Salari et al., 2025) and can even reach over 30% (C. Cheng et al., 2021). These cultural differences may partially explain the inconsistent rates of problematic TikTok use among young people across different countries. The inconsistent rates of problematic TikTok use can be attributed not only to cultural differences but also to the diverse diagnostic criteria employed by various measurement tools. Lenient diagnostic standards may lead to an inflated proportion of individuals being classified as problematic users. Recent research suggests that some criteria derived from addiction frameworks may not accurately reflect problematic engagement with social media, potentially leading to inflated prevalence rates and the overpathologization of typical behaviors (Flayelle et al., 2022; Fournier et al., 2023). Specifically, several authors have criticized certain criteria, such as salience and tolerance, for their lack of validity in the context of non-substance-related addictions (Fournier et al., 2023; Starcevic, 2016).

Extensive empirical studies have substantiated the effects of conventional problematic social media use, particularly problematic Facebook use, on individuals' physical and mental health, including factors such as sleep quality, depression, and anxiety (Al Mamun & Griffiths, 2019; Atroszko et al., 2018; Ho et al., 2021; Lozano Blasco et al., 2020). Additionally, several review articles have synthesized these findings (e.g., Duradoni et al., 2020; Frost & Rickwood, 2017; Marino et al., 2018). However, inquiries into the effects of problematic short-form video use have only begun to emerge in recent years. It has been found that problematic short-form video use has negative effects on individuals' attention (Chen et al., 2022), memory (Sha & Dong, 2021), academic performance (Zahra et al., 2022), academic procrastination (Q. Liu & Li, 2024), and mental health (Chao et al., 2023). However, there is currently a lack of research, especially longitudinal studies, examining the impact of the problematic use of short-form video apps, specifically TikTok, on the school engagement of university students. The present study aims to address these research gaps by conducting a one-year longitudinal investigation into the predictive effects of problematic TikTok use on school engagement. Furthermore, it seeks to explore the mediating role of self-control, as well as the moderating effects of gender and use patterns.

Problematic TikTok Use Severity and School Engagement

University students are at a crucial stage in their academic development, and school engagement is an important factor in their academic achievement (Martínez et al., 2019; Saqr et al., 2023) and career success (Hu & Wolniak, 2010). Prior studies have established a strong relationship between internet use, particularly problematic internet use, and university students' school engagement (Buzzai et al., 2021; Singh & Srivastava, 2021). Further research has shown that internet game disorder negatively impacts both academic engagement and achievement among university students (Schmitt & Livingston, 2015). Additionally, time spent on social media and problematic social media use are inversely proportional to university students' academic engagement (Iorliam & Ode, 2014; Zhuang et al., 2023). Facebook overuse is a significant predictor of decreased behavioral engagement in academic activities (Datu et al., 2018). Nevertheless, limited research has confirmed the impact of problematic usage of short-form applications, such as TikTok, on school engagement. Problematic short-form video use among university students leads them to spend a significant amount of time creating or consuming short-form videos, resulting in decreased behavioural engagement in their academic tasks. In addition to behavioural engagement, problematic short-form video use may induce negative social comparison due to the exhibitionistic social information presented in short-form videos (Meier & Johnson, 2022; Pan et al., 2023), causing doubts about their academic efficacy and disrupting their emotional and cognitive engagement in their academic pursuits. Therefore, the present study proposes the hypothesis that problematic TikTok use severity negatively predicts university students' school engagement (**H1**).

The Mediating Role of Self-Control

In addition to its direct impact, problematic TikTok use may have an indirect effect on university students' school engagement through certain mediators, such as self-control. Self-control refers to an individual's ability to regulate his or her behaviours and emotions on the basis of long-term goals (Hirschi et al., 2004). Research has demonstrated that people with strong self-control tend to have better physical health (Miller et al., 2011), more positive emotions (King & Gaerlan, 2014), and better interpersonal connections (Righetti & Finkenauer, 2011). Furthermore, individuals who possess greater self-control exhibit heightened levels of school engagement (King & Gaerlan, 2014; C. Li et al., 2022), which consequently leads to increased academic achievement (Troll et al., 2021; Zettler, 2011). For example, research indicates a significant positive correlation between self-control in preschool and school engagement as well as academic achievement in the school-age period (Robson et al., 2020). In contrast, a deficiency in self-control might result in individuals directing their time and energy towards activities that are unrelated to studying or academic pursuits, consequently undermining their school engagement.

Furthermore, the problematic use of TikTok may undermine the self-control of young individuals. Self-control continues to develop throughout adolescence and early adulthood (Allemand et al., 2019; Burt et al., 2014; Yi et al., 2024), a critical period during which positive influences can promote an increase in self-control, whereas negative influences may impede it (Jo & Armstrong, 2018; Meldrum et al., 2012). According to the strength model of self-control, an individual's self-control is contingent upon limited psychological resources, and the depletion of these resources can result in self-control failure (Baumeister et al., 2007). Addictive behaviours can negatively impact the psychological capital of university students (C. Zhang et al., 2021), intensify negative emotions (Xie et al., 2023), and amplify negative response styles (You et al., 2021). Such negative emotions and thoughts can drain already limited psychological resources, exacerbating the challenge of maintaining high self-control levels (Baumeister et al., 2007; Hagger et al., 2010). Previous studies have confirmed that problematic internet use has a significant negative predictive effect on self-control among university students (Agbaria, 2021; Sun et al., 2022). Because it is possible that problematic TikTok use predicts individual self-control and that self-control further predicts school engagement, we propose that self-control plays a mediating role in the relationship between problematic TikTok use severity and school engagement (**H2**).

Moderating Roles of Gender and TikTok Use Patterns

There may be gender differences in the direct and indirect effects of problematic TikTok use on school engagement among university students. Previous studies have indicated that male students tend to exhibit higher levels of problematic internet use than do female students in various countries (Anderson et al., 2017; Rigelsky et al., 2021). Males are also more significantly affected by problematic internet use than females are (Ananda, 2024). This finding implies that the consequences of problematic TikTok use for self-control and school engagement could be more severe for men. With respect to self-control, multiple studies have highlighted that men generally

exhibit lower levels of self-control than women do (Hamama & Hamama-Raz, 2021; Shoenberger & Rocheleau, 2017). This notable gender difference might stem from the fact that the psychological resources that males utilize to maintain self-control are more vulnerable to diverse influences, especially negative behaviours. As a result, heightened problematic TikTok use could lead to greater depletion of these resources among men, thus increasing the likelihood of self-control failure. Regarding school engagement, research indicates that females often demonstrate higher levels of school engagement than males do (Bang et al., 2020; Lam et al., 2012), while problematic internet use is identified as a risk factor for reduced school engagement (Buzzai et al., 2021; Singh & Srivastava, 2021). Hence, the adverse effects of problematic TikTok use on school engagement might also be more pronounced for men. Consequently, the problematic usage of TikTok could have a more adverse effect on male students than on female students. Therefore, we propose the following hypotheses:

H3a: The direct effect of problematic TikTok use severity on school engagement is more pronounced among male students than among female students.

H3b: The indirect effect of self-control is stronger among male students than among female students.

Moreover, TikTok use patterns may play a role in moderating the direct and indirect effects of problematic TikTok use on school engagement. As previously mentioned, the use patterns of short-form video applications can be categorized as active use (i.e., posting or sharing short-form videos) or passive use (i.e., browsing or watching short-form videos; Pan et al., 2023). Although both active and passive behaviours are likely to occur within a particular time frame, a more definitive tendency towards either active or passive use can be determined by combining the values of these two variables. On the basis of the active-passive model of social networking site (SNS) use (Verduyn et al., 2022) and relevant studies, actively participating in self-presentation and emotional sharing often facilitates the enhancement of self-esteem (Krause et al., 2021), the reinforcement of subjective well-being (de Vaate et al., 2020; Lin et al., 2022), and the deepening of interpersonal relationships (Lian et al., 2017). In contrast, passively browsing and consuming diverse forms of content on social media platforms can diminish self-esteem (Krause et al., 2021), decrease subjective well-being (de Vaate et al., 2020), and disturb interpersonal relationships (Rus & Tiemensma, 2017). Regarding self-control, research has revealed that factors such as self-esteem, subjective well-being, and positive interpersonal relationships all play a pivotal role in bolstering self-control resources and increasing overall levels of self-control (F. Liu et al., 2020; Peng et al., 2023; Tice et al., 2004). Consequently, for individuals who primarily engage in proactive usage of short-form videos, the potential detrimental impact of problematic TikTok use on their self-control resources may not be as pronounced; hence, active engagement helps sustain and expand their psychological resources. With respect to school engagement, several studies have indicated that self-esteem, subjective well-being, and positive interpersonal relationships can motivate individuals to more actively invest in their studies (Karababa, 2020; Moses & Villodas, 2017; Zhu et al., 2019). Thus, for individuals who primarily use short-form videos in an active manner, enhancing their self-esteem, subjective well-being, and interpersonal relationships may serve to mitigate any adverse effects that problematic TikTok use might otherwise have on their academic engagement. Consequently, we posit the following hypotheses:

H4a: The direct impact of problematic TikTok use severity on school engagement is likely to be more potent among university students who primarily engage in passive use than among those who predominantly engage in active use.

H4b: The indirect effect of self-control is more pronounced in university students who predominantly engage in passive use, whereas it may be less significant for those who primarily engage in active use.

The Present Study

The present study sought to investigate the direct and indirect effects of problematic TikTok use severity on school engagement among university students and to explore the potential variations in gender and TikTok use patterns. University students are at a pivotal stage in their development, marked by the transition to adults. During this period, they often experience intense feelings of uncertainty and instability, which can lead them to adopt maladaptive coping strategies (Arnett et al., 2014; Lane, 2015). Many students utilize TikTok, a popular social media platform, to manage negative emotions and seek entertainment (China Youth Daily, 2022; Yao et al., 2023). Concurrently, before fully entering the workforce and society, students must undergo substantial self-exploration, particularly concerning their career paths (Arnett, 2000; Grosemans et al., 2020). School engagement plays a crucial role in this transitional phase, serving as an essential avenue for career exploration and skill development

(Datu & Buenconsejo, 2021; Storlie & Toomey, 2020). Consequently, investigating the relationship between problematic TikTok use and school engagement among university students in emerging adulthood, examining how these factors are interrelated and identifying which groups exhibit a stronger or weaker influence of problematic TikTok use on school engagement are essential.

Throughout a one-year longitudinal study, we collected data on three separate occasions, with a six-month gap between two of the data collection points. Compared with the numerous cross-sectional investigations of the relationship between internet use and academic engagement, longitudinal research offers a more rigorous approach for determining the predictive effects among variables. Within a mediation model framework, three waves of data collected over a one-year period can effectively clarify the temporal order of independent variables, mediating variables, and dependent variables. The longitudinal design mitigates potential common method bias that may arise from simultaneous data collection and overcomes the challenge of addressing multiple competing models. In conclusion, the present study aims to specifically examine the mediating role of self-control in the longitudinal relationship between problematic TikTok use and school engagement, alongside the moderating effects of gender and usage patterns. We examined the extent to which problematic TikTok use severity at Time 1 (T1) had a significant predictive effect on self-control at Time 2 (T2), which in turn predicted school engagement at Time 3 (T3). Moreover, we investigated whether the direct effect of problematic TikTok use severity at T1 on school engagement at T3 and the mediating effect of self-control at T2 are stronger among male university students and/or those who use TikTok in a predominantly passive manner.

Methods

Participants and Procedure

The present study received approval from the ethics committee of the institution with which the first author is affiliated. A total of 656 university students from two universities in South China were invited to participate in a longitudinal questionnaire survey. At Time 1 (April 2022), 636 students, including 328 males and 308 females, completed the questionnaires. Six months later, at Time 2 (October 2022), 97.2% of the initial sample ($n = 618$, consisting of 318 males and 300 females) completed the second survey. Another six months later, at Time 3 (April 2023), 92.8% of the initial sample ($n = 590$, including 303 males and 287 females) continued in the study. The participants received a notebook and a ballpoint pen as a token of appreciation for each data collection session that they attended. Data from the remaining 590 university students were included in the formal analysis to test our hypotheses. The mean age of these participants was 19.83 years ($SD = 1.24$).

Measurements

Problematic TikTok Use

At Time 1, problematic TikTok use severity was assessed using seven items adapted from the Short-form Video Addiction Subscale of the Mobile Phone Addiction Type Scale (Q.-Q. Liu et al., 2022). To enhance the effectiveness of the scale in measuring TikTok usage behaviors, we asked the participants to evaluate their actual level of engagement with TikTok in their daily lives. These items (e.g., *I can spend hours exclusively watching various short-form videos on TikTok*) were rated on a five-point scale ranging from 1 (*almost never*) to 5 (*almost always*). The internal consistency of the problematic TikTok use scale, as measured by Cronbach's α , was 0.85. The indicators of the confirmatory factor analysis ($\chi^2/df = 2.23$, RMSEA = .05, CFI = .99, NFI = .98, and TLI = .99) suggest that the scale has good validity.

TikTok Use Patterns

Given that individuals may engage in both active and passive use behaviors simultaneously within a given time frame, it is crucial to consider both aspects to distinguish between active and passive use patterns and to account for their mutual influence. Consequently, TikTok use patterns can be derived by subtracting passive use scores from active use scores. Higher scores indicate a dominant mode of active use, whereas lower scores indicate a dominant mode of passive use. The participants were invited to assess their actual level of engagement with short-form video applications, particularly TikTok, in their daily lives. Three items adapted from the Active Facebook Use

Scale (Frison & Eggermont, 2016) were employed to measure the extent of active TikTok use. The following is an example item: *I post short-form videos about my life publicly*. Similarly, passive TikTok use was evaluated using three items adapted from the passive SNS use scale (Tandoc et al., 2015), which was previously validated in its Chinese version (Liu et al., 2017). The following is an example item for passive TikTok use: *I view short-form videos created by others but do not make any comments*. The participants assessed both sets of items on a seven-point scale, with a rating of 1 corresponding to *strongly disagree* and a rating of 7 indicating *strongly agree*. The active TikTok use scale and passive TikTok use scale exhibited high internal consistency, as demonstrated by Cronbach's α coefficients of .93 and .89, respectively.

Self-Control

At Time 2, self-control was assessed using the Brief Self-Control Scale (Tangney et al., 2008). This instrument is composed of thirteen items, such as *I am good at resisting temptation*, which participants rate on a five-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The scale has demonstrated sound reliability and validity within the Chinese population (Situ et al., 2016). The Cronbach's α for this scale was .85.

School Engagement

Both the Time 1 and Time 3 assessments of school engagement employed the Behavioral-Emotional-Cognitive School Engagement Scale (BEC-SES; Y. Li, 2010). The scale contains fifteen items that measure three sub-dimensions: behavioural engagement, emotional engagement, and cognitive engagement. The participants responded on a scale ranging from 1 (*never*) to 4 (*always*). Higher overall scores were indicative of a greater level of school engagement. Although the BEC-SES has predominantly been used with adolescents, it has also been applied to university students, demonstrating strong reliability and validity (e.g., Sasser et al., 2022; Sasser et al., 2023). To better tailor the scale for measuring the university student population, we made appropriate adjustments to some of the item descriptions. For example, we revised *complete homework on time* to *complete coursework on time*. The internal consistency of the scale, as assessed by Cronbach's α , was .89 at Time 1 and .92 at Time 3. The indicators from the confirmatory factor analysis at Time 1 (T1) were as follows: $\chi^2/df = 3.23$, RMSEA = .06, CFI = .96, NFI = .95, and TLI = .96. At Time 3 (T3), the results were as follows: $\chi^2/df = 4.12$, RMSEA = .07, CFI = .95, NFI = .94, and TLI = .94. These findings suggest that the scale has strong validity at both Time 1 and Time 3.

Analytic Strategies

A preliminary analysis was conducted to examine gender differences in the core variables, as well as the intercorrelations among them. A subsequent mediation analysis was performed using Model 4 in the PROCESS macro for SPSS (Hayes, 2013) to investigate the mediating role of self-control in the longitudinal relationship between problematic TikTok use severity and school engagement. Additionally, we performed moderated mediation analyses using Model 8 in the PROCESS macro for SPSS (Hayes, 2013) to examine whether gender and TikTok use patterns moderated the direct and indirect effects of problematic TikTok use on school engagement. Age, TikTok use time, and baseline school engagement were included as covariates to control for potential impacts on the results. All continuous variables were standardized prior to their inclusion in the PROCESS analysis. Moreover, when performing the moderating effect analysis within PROCESS, we employed the "mean center for products" function to ensure that both the independent variable and the moderator variable were centred.

Results

Preliminary Analysis

The results of the independent samples *t* test revealed significant differences in the core variables between males and females (refer to Table 1). Specifically, males presented higher scores for T1 problematic TikTok use severity and lower scores for T2 self-control, T1 school engagement, and T3 school engagement.

Table 1. *Test of Gender Differences in the Core Variables.*

Variables	Group	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>
T1 Problematic TikTok use severity	Males	3.12	0.87	3.78	<.001
	Females	2.83	0.96		
T2 Self-control	Males	2.77	0.76	-3.04	.002
	Females	2.95	0.64		
T1 School engagement	Males	3.10	0.64	-5.25	<.001
	Females	3.31	0.33		
T3 School engagement	Males	2.69	0.69	-5.60	<.001
	Females	2.95	0.45		

The correlations among the variables are presented in Table 2. In both the male and female groups, T1 problematic TikTok use severity was negatively related to T1 school engagement, T2 self-control, and T3 school engagement. T2 self-control was positively related to T1 and T3 school engagement.

Table 2. *Intercorrelations Between the Variables.*

Variables	<i>M</i>	<i>SD</i>	1	2	3	4
1. T1 Problematic TikTok use severity	2.98	0.92	—	-.14***	-.17***	-.26***
2. T2 Self-control	2.86	0.71	-.57***	—	.21***	.39***
3. T1 School engagement	3.20	0.52	-.40***	.36***	—	.42***
4. T3 School engagement	2.80	0.60	-.50***	.57***	.56***	—

Note. *** $p < .001$. The values above and below the diagonal represent females and males, respectively.

Testing the Mediation Model

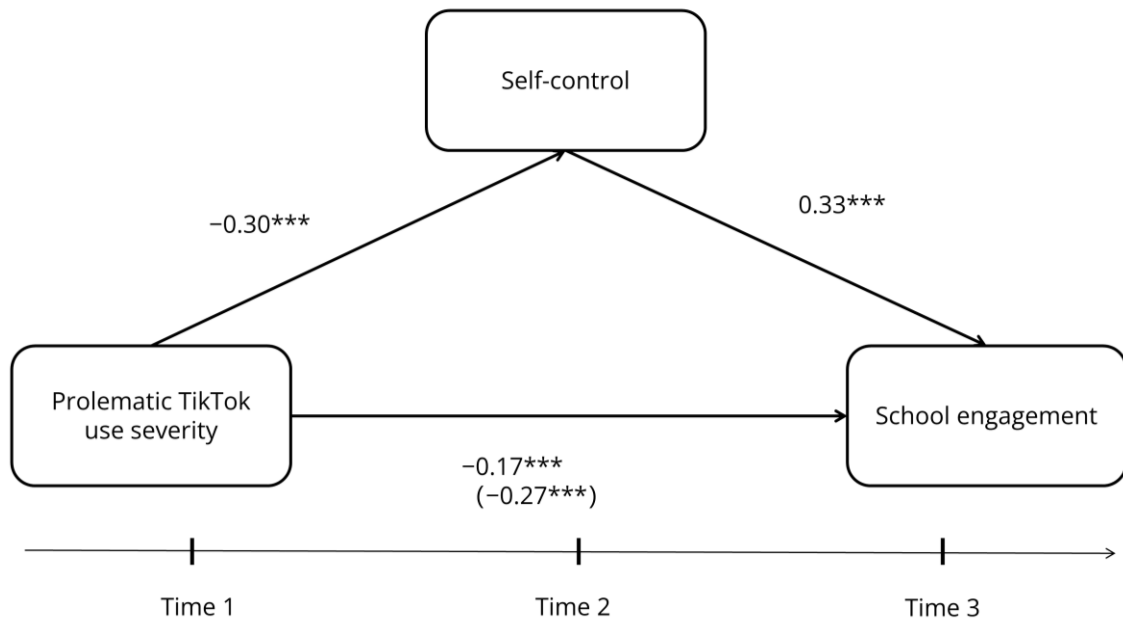
Table 3 and Figure 1 present the results of the mediation analysis examining the role of self-control in the longitudinal relationship between problematic TikTok use severity and school engagement. After controlling for age, TikTok use time, and T1 school engagement, T1 problematic TikTok use severity negatively predicted T3 school engagement ($\beta = -.27, p < .001$) when the mediator (self-control) was not accounted for. Moreover, T1 problematic TikTok use severity had a negative effect on T2 self-control ($\beta = -.30, p < .001$). When the mediator was included in the analysis, T2 self-control was positively associated with T3 school engagement ($\beta = .33, p < .001$), and the predictive effect of T1 problematic TikTok use severity remained significant ($\beta = -.17, p < .001$).

Table 3. *Mediation Analysis of Self-Control.*

Regression equation		Significance of regression coefficients				Bootstrap	
Outcome variables	Independent variables	β	<i>SE</i>	<i>t</i>	<i>p</i>	LLCI	ULCI
T3 School engagement	Age	.04	.03	1.19	.233	-.02	.09
	TikTok use time	.04	.04	1.22	.224	-.03	.11
	T1 School engagement	.46	.05	8.69	<.001	.35	.56
	T1 PTUS	-.27	.04	-5.95	<.001	-.35	-.18
T2 Self-control	Age	-.03	.04	-0.87	.386	-.11	.04
	TikTok use time	-.05	.04	-1.30	.195	-.12	.02
	T1 School engagement	.24	.05	4.81	<.001	.14	.33
	T1 PTUS	-.30	.05	-5.46	<.001	-.40	-.19
T3 School engagement	Age	.05	.03	1.67	.095	-.01	.10
	TikTok use time	.06	.03	1.83	.068	-.01	.12
	T1 School engagement	.38	.05	7.15	<.001	.27	.48
	T1 PTUS	-.17	.04	-4.12	<.001	-.25	-.09
	T2 Self-control	.33	.05	7.17	<.001	.24	.42

Note. $N = 590$. PTUS = problematic TikTok use severity. Bootstrap sample size = 5,000. LL = lower limit, CI = confidence interval, UL = upper limit.

Figure 1. *The Mediating Role of Self-Control in the Longitudinal Relationship Between Problematic TikTok Use Severity and School Engagement.*



Note. Age, T1 TikTok use duration and T1 school engagement were included as covariates in the model. *** $p < .001$

The bias-corrected percentile bootstrap method revealed that the mediating effect of T2 self-control on the relationship between T1 problematic TikTok use severity and T3 school engagement was $-.10$, accompanied by a 95% confidence interval ranging from $-.15$ to $-.06$. The mediating effect of self-control accounted for 36.9% of the overall effect of problematic TikTok severity on school engagement.

Testing the Moderating Effect of Gender

Table 4 presents the moderated mediation analysis used to test for gender differences in the mediating role of self-control. After controlling for age, TikTok use time, and T1 school engagement, the interaction of T1 problematic TikTok use severity and gender positively predicted T2 self-control ($\beta = 0.44$, $p < .001$). However, the interaction of T1 problematic TikTok use severity and gender did not significantly affect T3 school engagement ($\beta = .13$, $p = .115$).

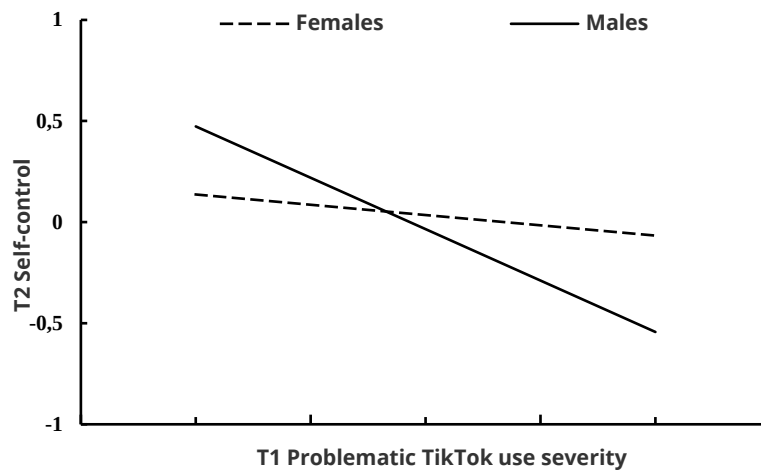
Table 4. *Moderated Mediation Model Analysis of Self-Control and Gender.*

Regression Models	β	SE	t	p	Bootstrap	Bootstrap
Regression model predicting T2 self-control						
Age	-.02	.04	-0.58	.559	-.10	.05
TikTok use time	-.03	.04	-0.92	.357	-.10	.04
T1 School engagement	.18	.05	3.55	<.001	.08	.28
Gender	.07	.08	0.88	.382	-.08	.21
T1 Problematic TikTok use severity	-.33	.05	-6.60	<.001	-.43	-.23
T1 Problematic TikTok use severity $\times$ Gender	.44	.09	4.65	<.001	.25	.62
Regression model predicting T3 school engagement						
Age	.06	.03	2.16	.031	.01	.12
TikTok use time	.07	.03	2.05	.041	.003	.13
T1 School engagement	.35	.05	6.44	<.001	.24	.46
Gender	.19	.06	3.20	.001	.07	.31
T1 Problematic TikTok use severity	-.18	.04	-3.95	<.001	-.26	-.09
T2 Self-control	.31	.05	6.40	<.001	.22	.41
T1 Problematic TikTok use severity $\times$ Gender	.13	.08	1.58	.115	-.03	.30

Note. $N = 590$. Bootstrap sample size = 5,000. SE = standard error. LL = lower limit, CI = confidence interval, UL = upper limit.

Conditional analysis revealed that the effect of T1 problematic TikTok use severity on T3 school engagement was significant for both males ($\beta = -.24, p = .001$) and females ($\beta = -.11, p = .02$), indicating no significant gender difference. In contrast, the relationship between T1 problematic TikTok use severity and T2 self-control was notably stronger among male university students ($\beta = -.54, p < .001$) than among female university students, for whom the relationship was not significant ($\beta = -.11, p = .120$), suggesting a significant gender difference (see Figure 2). Additionally, the indirect effect of T1 problematic TikTok use severity on T2 self-control was significant in males, effect = $-.17$, 95% CI $[-.24, -.12]$, but not significant in females, effect = $-.03$, 95% CI $[-.08, .01]$, indicating notable gender disparities.

Figure 2. *The Relationship Between T1 Problematic TikTok Use Severity and T2 Self-Control in Males and Females.*



Testing the Moderating Effect of Use Patterns

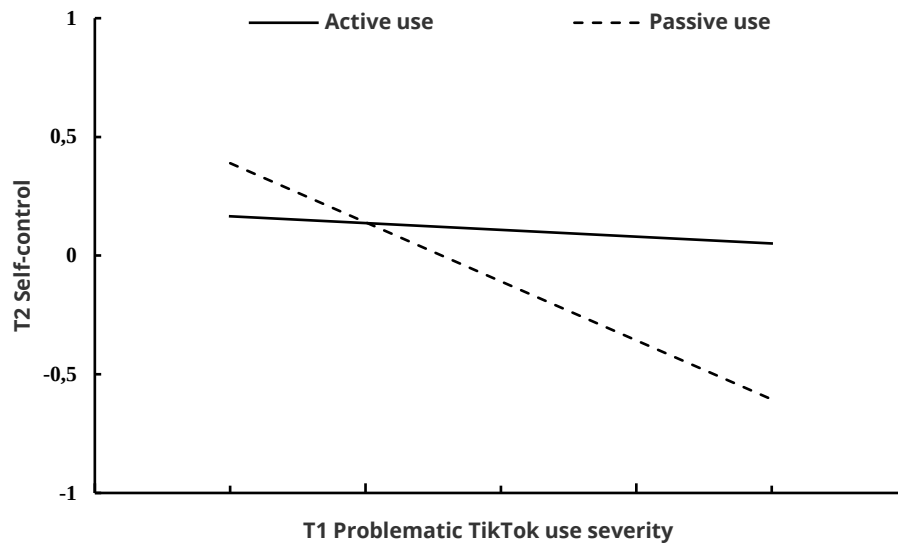
Table 5 presents the moderated mediation analysis used to test for use pattern differences in the mediating role of self-control. After controlling for age, TikTok use time, and T1 school engagement, the interaction of T1 problematic TikTok use severity and use patterns positively predicted T2 self-control ($\beta = .11, p = .021$). However, the interaction of T1 problematic TikTok use severity and use patterns did not significantly affect T3 school engagement ($\beta = -.02, p = .592$).

Table 5. *Moderated Mediation Model Analysis of Self-Control and Use Patterns.*

Regression Models	β	SE	<i>t</i>	<i>p</i>	Bootstrap	Bootstrap
Regression model predicting T2 self-control						
Age	-.03	.04	-0.88	.381	-.11	.04
TikTok use time	-.04	.04	-1.10	.271	-.11	.03
T1 School engagement	.24	.05	5.06	<.001	.15	.34
Use patterns	.05	.04	1.08	.279	-.04	.13
T1 Problematic TikTok use severity	-.30	.05	-5.55	<.001	-.40	-.19
T1 Problematic TikTok use severity $\times$ Use patterns	.11	.05	2.31	.021	.02	.21
Regression model predicting T3 school engagement						
Age	.05	.03	1.68	.095	-.01	.10
TikTok use time	.06	.03	1.79	.074	-.01	.12
T1 School engagement	.38	.05	7.08	<.001	.27	.48
Use patterns	-.01	.03	-0.14	.891	-.06	.06
T1 Problematic TikTok use severity	-.17	.04	-4.05	<.001	-.25	-.09
T2 Self-control	.34	.05	7.15	<.001	.24	.43
T1 Problematic TikTok use severity $\times$ Use patterns	-.02	.03	-0.54	.592	-.08	.05

Note. *N* = 590. Bootstrap sample size = 5,000. SE = standard error. LL = lower limit, CI = confidence interval, UL = upper limit.

Figure 3. The Relationship Between T1 Problematic TikTok Use Severity and T2 Self-Control Among University Students With Different TikTok Use Patterns.



Conditional analysis indicated a significant direct effect of T1 problematic TikTok use severity on T3 school engagement among students who primarily engage in passive use ($\beta = -.18, p = .006$) and those who predominantly engage in active use ($\beta = -.15, p < .001$), with no significant gender differences observed. A robust relationship was identified between T1 problematic TikTok use severity and T2 self-control among university students engaging primarily in passive use ($\beta = -.41, p < .001$), whereas this relationship was weaker among students with a dominant mode of active use ($\beta = -.18, p = .014$), suggesting significant gender differences. Additionally, the indirect effect of T1 problematic TikTok use severity on T2 self-control was stronger among students who predominantly engage in passive use, effect = $-.14$, 95% CI $[-.21, -.08]$, than among those who predominantly engage in active use, effect = $-.06$, 95% CI $[-.12, -.02]$.

Discussion

Although the prevalence of problematic TikTok use is not particularly high, ranging from 7.7% to 34.2% (Chao et al., 2023; Galanis et al., 2024; Smith & Short, 2022), the large number of TikTok users means that the absolute number of individuals experiencing these problems remains significant. We conducted a one-year longitudinal study to examine the influence of problematic TikTok use severity on university students' school engagement, including the underlying mechanisms and conditions involved. Our study revealed that problematic TikTok use severity not only had a direct negative effect on university students' school engagement but also indirectly predicted school engagement through the mediating role of self-control. Moreover, there were significant gender differences in the mediating role of self-control. That is, the indirect effect through self-control was more prominent among male students than among female students. Furthermore, the indirect effects of self-control varied with different TikTok use patterns. Compared with university students who are predominantly active users, the indirect effect of self-control was stronger among university students who are predominantly passive users. To the best of our knowledge, this study is among the first to investigate the longitudinal relationships among problematic TikTok use severity, self-control, and school engagement. Our study explains the longitudinal relationship between problematic TikTok use severity and school engagement among university students while also clarifying potential variations based on gender and TikTok use patterns. The findings of our study contribute to the existing body of research investigating the relationship between problematic internet use and school engagement among university students. Moreover, our results have practical implications for promoting enhanced school engagement among university students, specifically concerning the use of short-form video applications.

We discovered a noteworthy negative correlation between problematic TikTok use severity and school engagement among university students one year later. This finding aligns with those of previous research

investigating the association between problematic internet use or problematic mobile phone use and school engagement (e.g., Buzzai et al., 2021; Sharma, 2021). Problematic internet use and problematic mobile phone use are often characterized by a loss of productivity, which can negatively impact an individual's daily life (Leung et al., 2008; Q.-Q. Liu et al., 2022). Different from previous research we focused on TikTok, which is currently one of the most popular internet applications, to explore the growing issue of problematic TikTok use. Regardless of the form of problematic internet use, its development can significantly impair students' school engagement, leading to severe negative consequences. For university students, the severity of the impact of problematic TikTok use may manifest not only in behavioural engagement but also, more prominently, in emotional and cognitive engagement. The excessive focus on entertainment in short-form video content can lead students to perceive studying as dull and uninteresting, gradually diminishing their enthusiasm for learning. Furthermore, certain negative social concepts propagated through these short-form videos, such as the notion that "studying is useless," may undermine students' belief in the potential rewards of education, ultimately fostering the perception that learning is unimportant. The findings concerning the effect of problematic TikTok use on school engagement further extend existing research on the negative impacts of problematic TikTok use, suggesting that problematic TikTok use not only significantly predicts negative physical and mental health outcomes but also adversely affects academic development. Additionally, our study revealed that problematic TikTok usage not only exerted a direct predictive effect on school engagement but also had an indirect predictive effect. Specifically, self-control functioned as a mediating factor in the longitudinal relationship between the severity of problematic TikTok use and university students' school engagement.

In the first stage of the mediation model, our results indicate that problematic TikTok use can impair students' self-control. From a developmental perspective, self-control abilities significantly change between adolescence and adulthood, making them susceptible to diverse environmental and behavioural influences (Allemand et al., 2019; Burt et al., 2014; Yi et al., 2024). Our study suggests that problematic TikTok usage, which is recognized as a maladaptive behaviour, negatively impacts the self-control abilities of young individuals. Our findings align with those of previous research on problematic internet or smartphone use and its adverse effects on self-control among university students (Agbaria, 2021; Sun et al., 2022). They also coincide with the strength model of self-control proposed by Baumeister et al. (2007). On the basis of the strength model of self-control, regulating negative emotions and thoughts may deplete limited self-control resources, which could increase the risk of subsequent self-control failure (Baumeister et al., 2007; Hagger et al., 2010). Problematic internet use may exacerbate individuals' negative emotions (Qu et al., 2024; Xie et al., 2023), which require significant self-control resources to regulate (Fu & Tremayne, 2022). Problematic internet use may also trigger negative cognitive states such as rumination (You et al., 2021), which also demand substantial psychological resources for cognitive regulation (Baumeister et al., 2007; Hahm, 2011). Consequently, when comparing university students with lower levels of problematic TikTok engagement, it appears that those who excessively use TikTok may be more likely to experience self-control failure. Furthermore, from the perspective of the dual-system theory of self-control (Hofmann et al., 2009), self-control encompasses two distinct components: the reflective system and the impulsive system. The ultimate level of self-control is the outcome of the interaction between these two systems, akin to a tug of war between them, with the stronger system ultimately prevailing (Hofmann et al., 2009; Y. Liu et al., 2020). The impulsive system is tasked with reacting to emotional information, novel stimuli, and reward signals; its processes are largely automatic and require minimal cognitive resources (Hofmann et al., 2009; Strack & Deutsch, 2004). In contrast, the reflective system serves as a primary indicator of an individual's willpower and plays a crucial role in emotion regulation and decision-making (Friesen et al., 2008; Hofmann et al., 2009). Because the reflective system relies on the conscious application of symbolic representation and operational systems, it operates relatively slowly and is more dependent on psychological resources (Evans, 2008; Hofmann et al., 2009). The severity of problematic TikTok usage activates the impulsive system by inundating users with an abundance of short-form videos that elicit automatic impulsive reactions. More importantly, short-form video applications such as TikTok incorporate distinct design features that continually promote impulsive engagement, including algorithmically curated infinite scrolling, autoplay, and variable reward structures. The technological environment created by these elements may not only exacerbate problematic usage but also directly heighten individual impulsivity. Furthermore, excessive engagement with TikTok can significantly deplete psychological resources, thus hindering the efficacy of the reflective system. Consequently, under the combined influence of the technological environment and maladaptive behaviors, the impulsive system within young people's dual self-control framework is likely to strengthen, whereas the reflective system may weaken, ultimately resulting in a significant decline in overall self-control.

In the second stage of the mediation model, self-control failure can weaken university students' school engagement, a finding that is consistent with those of previous studies on the relationship between self-control and school engagement (King & Gaerlan, 2014; C. Li et al., 2022; Robson et al., 2020). Insufficient self-control may prevent university students from directing their time, energy, and goals towards academics, resulting in declining behavioral, emotional, and cognitive school engagement. A prominent improvement over previous studies lies in our interpretation of the longitudinal relationship between problematic TikTok use and school engagement from the perspective of self-control. The mediation model in our study suggests that self-control is a proximal factor that explains the link between problematic TikTok use and reduced school engagement among university students. However, because self-control plays only a partial mediating role, other factors may also be significant in explaining the relationship between problematic TikTok use and university students' school engagement.

The absence of gender differences in the direct effects of problematic TikTok use suggests that its influence is equally strong for both male and female university students. Regardless of gender, problematic TikTok use significantly impacts school engagement. Although the direct effect did not significantly vary by gender, it was found that the mediating effect differed across different gender groups. These findings indicate the importance of a comprehensive analysis that considers both the direct and indirect effects of problematic TikTok use on school engagement while also comparing these effects between males and females.

Compared with females, the mediating effect of self-control was more evident among male university students. Previous studies have shown that self-control (Hamama & Hamama-Raz, 2021; Shoenberger & Rocheleau, 2017) and school engagement levels are significantly lower among male students than among female students (Bang et al., 2020; Lam et al., 2012), which is consistent with the results of our study. The dual-system model of self-control posits that self-control results from the interaction between the reflective and impulsive systems, with the stronger prevailing (Hofmann et al., 2009; Y. Liu et al., 2020). Compared with females, young males tend to display greater levels of behavioural impulsivity, which is influenced by various factors (Chapple & Johnson, 2007; Weafer & de Wit, 2014), leading to a lower overall level of self-control. Consequently, male university students with low levels of control may struggle to engage in academic tasks when faced with various stimuli. The problematic use of TikTok appears to have a more pronounced effect on males' self-control levels, which may be associated with the differing functions of TikTok usage across genders. Research indicates that females tend to use short-form video apps primarily for social interaction, whereas males are more likely to engage with the platform for entertainment purposes (Tu et al., 2023). Although short-form video entertainment can be enjoyable, it may disrupt emotional equilibrium, diminish positive emotions, and provoke negative feelings (X. Cheng et al., 2023; Jiang & Ma, 2024). Excessive immersion in highly entertaining short-form videos can lead to intense emotional experiences that deplete psychological resources. Some individuals report experiencing withdrawal symptoms, such as psychological distress, after they discontinue short-form video usage (Q.-Q. Liu et al., 2022), which complicates efforts to maintain self-control. In addition, male university students reported high levels of problematic TikTok use in the present study. Research has consistently shown that males generally have higher levels of problematic internet use than females do (Anderson et al., 2017; Rigelsky et al., 2021), although females tend to exhibit higher levels of problematic social media use when specific behaviors are examined (Su et al., 2020). Our research further indicates that males are a vulnerable group for excessively using short-form video applications. As one of the most popular online services, short-form videos are characterized by being highly entertaining and fragmented, which may be more attractive to men. Therefore, under the influence of more serious problematic TikTok use behaviours, male university students experience a more significant decrease in self-control, resulting in even lower levels of school engagement.

Compared with students who primarily engage in active TikTok use, those who primarily engage in passive use experience a stronger negative impact on school engagement because of problematic TikTok use. This finding aligns with the active-passive model of SNS use (Verduyn et al., 2017; 2022). In general, the active use of various social media platforms has been associated with positive changes in self-esteem, subjective well-being, and interpersonal relationships (de Vaate et al., 2020; Krause et al., 2021, Lian et al., 2017). It is possible that the active use of TikTok may also have similar effects. The sustained use of TikTok might be attributed to the positive reinforcement that active use provides, despite the occasional instances of passive use and negative experiences during certain periods of TikTok use. In terms of the specific results, use patterns did not significantly moderate the direct effect of problematic TikTok use. However, use patterns significantly moderated the indirect effect of self-control, although the moderating effect was not particularly strong. In other words, both active and passive use of TikTok directly reduce school engagement. However, individuals who primarily engage in passive use experience a more noticeable decrease in self-control, leading to more severe damage to school engagement.

Individuals who primarily engage in passive consumption often browse and watch short-form videos without any form of communication or interaction. Passive consumption allows them to absorb a substantial amount of information in a short time frame, which can likely lead to information overload (Chung et al., 2023; Ye et al., 2023). Furthermore, the extreme beautification and overly positive portrayals in these short-form videos may provoke negative social comparisons (Pan et al., 2023) and foster feelings of negativity (Gurtala & Fardouly, 2023; Mink & Szymanski, 2022). Both information overload and negative emotions can deplete psychological resources (Chester et al., 2016; Reutskaja et al., 2020), thus intensifying the detrimental effects of problematic TikTok on self-control. The findings suggest that, regardless of the use pattern, once TikTok use becomes excessive, it will have negative consequences. It is crucial to exercise caution even with active use behaviors that lead to positive experiences and to prevent the intensity of active use from exceeding reasonable standards and developing into problematic use.

Implications and Limitations

The present study provides valuable insights for educational practice. First, given the lasting negative effects of problematic TikTok use, it is recommended that universities consider offering lectures or courses on short-form video literacy to their students as a preventative measure and discourage students from developing excessive short-form video use. Second, given that self-control acts as a proximal factor linking university students' problematic TikTok use severity to diminished school engagement, it is crucial for students to strive to improve their self-control to mitigate the negative effects of regularly consuming short-form videos. Recent research has shown that daily physical exercise (Boat & Cooper, 2019) and mindfulness meditation (Frieze et al., 2012; A. Zhang & Zhang, 2023) can effectively improve self-control. For example, researchers discovered that, compared with those in the control group, individuals in the experimental group demonstrated a significant increase in self-control following an eight-week mindfulness training programme (A. Zhang & Zhang, 2023). Mindfulness interventions can be delivered through formal group sessions with guidance and through informal techniques, such as mindful eating or mindful walking, which can be practised independently in daily life (Birtwell et al., 2019; Shankland et al., 2021). Thus, university students can improve their self-control by incorporating mindfulness meditation into their everyday activities. Similarly, regular exercise training can also help individuals effectively increase their self-control levels in daily life (Audiffren & André, 2015). In addition, helping young people become less influenced by the technological environment of TikTok could significantly reduce the impulsive system within their dual-system of self-control while enhancing the reflective system. Schools and parents should consider implementing awareness campaigns that educate young people about the design features of short-form video applications such as TikTok, particularly those that are intentionally crafted to promote continuous use and encourage deep engagement among users, such as algorithmically curated infinite scrolling, autoplay, and variable reward structures. Moreover, young individuals should take the initiative to regulate their time spent on short-form video apps, decrease their usage frequency, modify their usage patterns, and minimize their passive consumption, thus avoiding excessive engagement with algorithmically curated content and autoplay features. These strategies could effectively mitigate the negative impact of impulsive and problematic TikTok usage on self-control. Third, schools and parents need to pay greater attention to male university students and implement early preventative and remedial measures. Doing so is critical, not only because male students are more susceptible to problematic TikTok use than females are but also because problematic TikTok use has a more notable indirect influence on their school engagement. Finally, a thorough understanding of the adverse effects associated with problematic TikTok use, encompassing both active and passive usage, is essential. When implementing practical interventions, particular emphasis should be placed on addressing the potentially harmful consequences of passive short-form video consumption among university students. Simultaneously, it is important to raise awareness among young individuals about the potential for significant harm resulting from excessive active engagement with short-form videos.

Several limitations of this study should be acknowledged. First, the data were exclusively collected through participants' self-reports, which may introduce subjective biases. Specifically, the participants might display biases in their evaluations of problematic TikTok use severity, self-control, and school engagement. Future research should aim to gather data from multiple sources, for example, by integrating self-reported information with reports from parents, teachers, or peers. Second, there might be multiple mediating factors in the longitudinal relationship between problematic TikTok use severity and university students' school engagement, but our research focused only on the role of self-control. Future research could investigate additional factors associated with school engagement, such as academic efficacy (Hong et al., 2021; Olivier et al., 2019) and academic procrastination (B. Li et al., 2023). Third, in addition to gender and usage patterns, other crucial factors, such as

socioeconomic status and mental health conditions, may moderate the relationship between problematic TikTok use severity and school engagement. Future research should consider incorporating these pertinent factors into their analyses to gain a more in-depth understanding of the intricate association between TikTok use and school engagement. Moreover, although problematic TikTok use severity can adversely predict school engagement, some studies have indicated that moderate use may positively promote learning engagement and learning outcomes (Wang et al., 2023; Wang et al., 2024). Future research should consider a comprehensive examination of the effects of TikTok use on academic development, considering both positive and negative aspects. Finally, our study did not examine potential cultural differences in the impact of problematic TikTok use on academic engagement. Cultural differences in the prevalence of problematic social media use suggest that problematic TikTok use may be particularly pronounced among Chinese university students (C. Cheng et al., 2021; Salari et al., 2025). In recent years, Chinese students have faced considerable academic and employment pressures, possibly leading them to use short-form videos more frequently as a means of alleviating negative emotions. Additionally, the rising sentiment in Chinese society that “studying is useless” may render university students’ school engagement more sensitive and vulnerable, increasing their susceptibility to the influence of technological media. However, determining whether substantial cultural differences exist in the long-term effects of problematic TikTok use on university students’ academic engagement and understanding the underlying mechanisms involved necessitate more rigorous empirical research for a thorough investigation. In future research, scholars may conduct a detailed analysis of the cultural differences associated with problematic TikTok usage and its effects.

Conclusions

There is a dearth of research examining the long-term effects of problematic TikTok use, specifically its impact on university students’ school engagement. We conducted a one-year longitudinal study through three waves of data collection, analysing the effect of problematic TikTok use on university students’ school engagement. The results revealed that problematic TikTok use severity both directly and indirectly predicted the school engagement of university students, with self-control being the critical mediating factor. The indirect role of self-control was more prominent among male university students than among female university students. In addition, the mediating effect of self-control was found to be stronger among university students who predominantly engage in passive use than among those who primarily engage in active use. The present study revealed the mediating mechanism in the relationship between problematic TikTok use severity and school engagement, as well as its conditions. This study provides answers to how problematic TikTok use severity is longitudinally related to university students’ school engagement and which groups are more or less affected. The findings enrich previous results concerning the relationship between problematic internet use and school engagement and provide practical implications for mitigating the impact of problematic TikTok use and improving university students’ school engagement.

Conflict of Interest

The authors have no conflicts of interest to declare.

Use of AI Services

The authors declare they have not used any AI services to generate or edit any part of the manuscript or data.

Authors’ Contribution

Qingqi Liu: conceptualization, methodology, investigation, data curation, formal analysis, funding acquisition, writing—original draft. **Chenyan Zhang:** funding acquisition, resources, investigation, writing—review & editing. **Ziying Yang:** writing—review & editing. **Xiaopan Xu:** writing—review & editing.

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About Authors

Qingqi Liu is a Lecturer in the Department of Psychology, Faculty of Arts and Sciences, Beijing Normal University at Zhuhai. Before assuming his current position, he was affiliated with the College of Education for the Future at the same university. His research interests center on the relationship between Internet use and mental health, with a specific focus on social media use and mobile phone addiction.

<https://orcid.org/0000-0001-5169-8689>

Chenyan Zhang is an Assistant Professor of the Department of Neurology, Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology. Her research concerns children and adolescent mental health.

Ziying Yang is a doctoral student at the College of Education for the Future, Beijing Normal University at Zhuhai. She also works at the Educational Development Foundation of Beijing Normal University at Zhuhai. Her research focuses on personality and individual differences.

Xiaopan Xu is a Lecturer of Institute for Public Policy and Social Management Innovation, College of Political Science and Public Administration, Henan Normal University. His research concerns children and adolescent mental health.

✉ Correspondence to

Qingqi Liu at No. 18, Jinfeng Road, Beijing Normal University at Zhuhai, Zhuhai, Guangdong Province, China,
liuqingqi@bnu.edu.cn

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