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The longitudinal relationships of problematic social media use, self-transcendence values and school adaptation: a two-wave study

Ting Li¹, Jiaqiong Xie¹, Yanjie Shan¹ and Ke Chen^{1*}

Abstract

This study aims to explore the temporal dynamics of the relationships between problematic social media use(PSMU), self-transcendence values, and school adaptation among college students.

Methods This study employed longitudinal cross-lagged analysis and structural equation modeling to investigate whether there is a mutual influence among PSMU, self-transcendence values, and school adaptation. Additionally, the study explored whether these variables serve as intermediaries in the associations between the other two variables.

Results Two thousand six hundred sixty-eight students were longitudinally followed up for two-wave. The results indicated PSMU predicted self-transcendence values and school adaptation 6 months later; self-transcendence values predicted PSMU and school adaptation 6 months later; and school adaptation predicted self-transcendence values and PSMU 6 months later. Moreover, each of them plays a mediating role in the association between the other two variables.

Conclusions These results support and expand the Self-worth Theory and Self-determination Theory that there is a bidirectional relationship between PSMU, self-transcendence values, and school adaptation. This result has implications for helping college students adapt to college life and reduce PSMU.

Keywords PSMU, Self-transcendence Values, School Adaptation, Longitudinal study

Introduction

School Adaptation refers to students' ability to engage positively in school activities and achieve academic success within the school environment, it serves as a significant criterion for assessing students' mental health [41]. Students who adapt well to school can effectively integrate into the school environment and learning tasks, experience psychological satisfaction, and attain a sense

of achievement, thereby facilitating optimal individual development [59]. Conversely, students who struggle with school adaptation may face academic challenges, such as falling behind in their studies [43], and may also develop internalizing issues, including depression [44]. The university period represents a critical transition from adolescence to adulthood, making adaptation to the new university environment a vital initial step. Factors such as poor interpersonal relationships, unhealthy internet usage, deviations in self-identity, self-defeatism, self-denial, and the discordance between the ideal self and the actual environment can contribute to various maladjustment issues among students. Numerous factors influence college students' school adaptation, and research has identified a close correlation between school

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adaptation and problematic social media use. Problematic use of social media (PSMU) is typically defined as excessive use characterized by compulsion or addiction, which includes symptoms such as dependence, tolerance, and withdrawal [14, 64, 65]. While there is a reciprocal relationship between PSMU and school adaptation, it remains uncertain whether PSMU directly or indirectly impairs college students' adaptability through various mediating factor.

The Self-worth theory and self-determination theory framework

Self-worth theory refers to the positive emotional experiences individuals have in their social lives, both towards society and themselves. This theory positively influences their emotions, cognition, and willpower, playing a protective role in the healthy development of their psychology [16]. Self-determination theory posits that when individuals' basic psychological needs are satisfied, their social adaptation improves. Conversely, when individuals are unable to meet their needs in social situations, they are more likely to experience maladaptive outcomes and may seek satisfaction in alternative areas, with the internet serving as a potential source for fulfilling these needs [50]. According to the Self-worth Theory [17] and Self-determination Theory [50], PSMU, as a significant individual factor, and school adaptation mutually influence each other through cognition, emotion, and arousal. For example, Brand et al. [8] argue that as PSMU intensifies, the associations among users' emotional and cognitive responses to specific stimuli (such as school adaptation), their decisions to use particular online platforms, experiences of gratification and compensation, and expectations regarding specific behaviors become stronger [8]. PSMU can be predicted as an input variable influencing school adaptation through internal states. On the other hand, PSMU is a significant consequence mediated by cognitive or other factors. For instance, Heatherton and Wagner [21] suggest that when individuals confront strong impulses or exert top-down cognitive control, the balance tends to shift towards brain regions associated with reward and emotional processing, making individuals more susceptible to self-regulatory failure and potentially leading to PSMU behavior [21]. Guided by these two theories, we explored the cyclical relationship between PSMU, a cognitive factor (self-transcendence), and school adaptation.

PSMU and school adaptation

In recent years, the rapid growth of the Internet and mobile social media has made PSMU a prominent topic of discussion. Undoubtedly, social media has facilitated quick information retrieval and has served as a vital

gateway to the outside world. However, improper or excessive use of social media can lead to adverse psychological effects and may even impact physical health [32]. The potential cause of this outcome, as suggested by the cognitive-behavioral model, is that individuals experiencing loneliness and anxiety may undergo cognitive dissonance, resulting in a decrease in self-transcendent values. This shift can subsequently lead to the development of maladaptive behavioral tendencies, such as PSMU. College students, who often possess limited experience and relatively weak self-control, are particularly susceptible to social media addiction [15]. Several studies have identified a significant negative correlation between PSMU and college students' adaptation, with a noted propensity for problematic online gaming over other online services [60]. For those who engage in PSMU, the internet often consumes an excessive amount of time, leading to challenges in real-life interactions and communication, as well as potential neglect of academic responsibilities [12]. Additionally, research indicates that college students with lower social adaptability are more susceptible to developing PSMU. Individuals with a high Fear of Missing Out (FoMO) are particularly inclined to use social media frequently to avoid missing important information [42]. Furthermore, prolonged and intense social media use can yield adverse effects, including poor social adaptation, impaired cognitive function, and conflicts within parent-child relationships [26, 67]. Some studies also provide indirect evidence that PSMU negatively impacts school adaptation. PSMU is frequently linked to excessive nighttime social media use and disrupted sleep patterns. Sleep deprivation can lead to daytime fatigue, adversely affecting students' attention and learning efficiency. Research has established a significant association between PSMU and sleep problems, which may further hinder students' adaptation to academic environments [55].

Moreover, a study found that difficulties in school adaptation at the pre-test significantly and positively predicted PSMU at the post-test. This indicates that college freshmen who experience challenges in adapting to school are more susceptible to developing PSMU [67]. Other research has also demonstrated that, in addition to environmental adaptation, the discomfort associated with role transitions serves as a catalyst for the emergence of PSMU. According to self-determination theory and discompensation theory, PSMU can be viewed as a compensatory behavior resulting from individuals' developmental obstacles. When individuals are unable to fulfill their needs in social contexts, they may be prone to adaptive disorders and seek satisfaction in alternative domains [4]. In fact, many contemporary online software applications are designed specifically to address this need. Existing evidence suggests that adolescents, due to their

relatively weak self-control capabilities, are more likely to develop internet addiction when they become excessively reliant on the internet [5]. Therefore, we hypothesize that school adaptation is a significant factor that can mitigate problematic social media use among college students.

PSMU and self-transcendence values

PSMU is typically characterized by an excessive obsession with the virtual world and a relentless pursuit of rewards and recognition on social media platforms [53]. This overreliance on social media may conflict with the values associated with self-transcendence, which emphasize the importance of individuals transcending their personal interests to pursue higher goals and social responsibilities [33]. Consequently, PSMU may lead individuals to invest excessive time and energy in the virtual realm, thereby neglecting their broader social responsibilities and interpersonal interactions. For instance, Jiang Yongzhi et al. argue that individuals experiencing PSMU demonstrate attentional biases towards cues related to problematic social media use and negative emotional information, which can hinder their ability to interact effectively with others in real life. This attentional bias not only adversely affects individuals' social skills but may also impair their sense of social responsibility and face-to-face communication abilities [26].

People's addiction to the virtual world may stem from their desire to escape real-life difficulties, coupled with a lack of fulfillment in self-worth and recognition from others. This leads many to turn to virtual environments, particularly social media. Yee [62] noted that the demographic of online gamers is increasingly shifting towards younger individuals, especially teenagers and college students. During early and mid-adolescence, these individuals often experience emotional challenges or low self-esteem, which heightens the risk of developing gaming addiction, particularly when engaging with interactive games [62]. The self-worth orientation theory posits that self-worth is the ultimate goal pursued by individuals. When an individual's self-worth is unmet in life, they may seek it elsewhere, and the internet provides an accessible avenue for this pursuit. As individuals establish connections online in search of self-worth, they may be more susceptible to internet addiction [35]. Excessive use of social media encroaches upon the time allocated to face-to-face social interactions, thereby diminishing the utilization of real-life social support. Adequate real-life social support is crucial in reducing the risk of PSMU [37].

Moreover, self-transcendence values may play a positive role in mitigating PSMU [27]. Individuals who prioritize social responsibility, empathy, and social participation are likely to exercise greater caution in their use of social media platforms, ensuring that these

platforms do not hinder their pursuit of higher goals. This positive orientation towards self-transcendence may assist individuals in better managing their social media use and integrating it into a broader spectrum of social and community engagement. Based on previous studies and theories, we further examine the mutual relationship between PSMU and self-transcendence values through a longitudinal survey.

Self-transcendence values and school adaptation

Many behaviors exhibited by adolescents may be influenced by their sense of self-worth. The self-worth theory, proposed by American educational psychologist Covington, posits that students' motivation to learn and their learning behaviors are shaped by their self-worth. Furthermore, self-worth can significantly predict school adjustment; individuals with higher self-worth tend to demonstrate greater levels of adaptation within the school environment [61]. Ye Zhi et al. [61] discuss that college students with higher self-worth tend to experience better school adjustment, which is specifically reflected in higher levels of well-being, improved academic performance, and fewer problem behaviors. A robust sense of self-worth, coupled with a strong social support system, significantly influences an individual's cognition, emotions, and behaviors. This is particularly important for freshmen who have just transitioned into college, a strong sense of self-worth and close relationships can help them navigate potential threats and risks (PSMU) during their developmental journey, enabling them to secure necessary social support at critical moments. Furthermore, students who embrace self-transcendence values are more likely to actively participate in school activities and exhibit higher levels of school adaptation. This finding suggests that the pursuit of self-transcendence fosters better integration into the school environment and the establishment of positive relationships within the school community [18]. Furthermore, studies have indicated a positive relationship between self-transcendence values and students' involvement in school and their academic self-concept. Students who embody self-transcendence values tend to be more actively engaged in school activities and exhibit greater confidence in their academic abilities. These factors collectively contribute to an enhanced adaptation to the school environment [29, 57]. This value orientation encourages students to actively engage in school activities, foster positive relationships within the school community, and attain improved academic and social outcomes, thereby facilitating their adaptation to the school environment.

On the other hand, school adaptation fosters self-transcendence values. Effective school adaptation can enhance students' sense of self-transcendence, boost

self-esteem and self-confidence, and consequently promote their mental health and well-being. Conversely, if students struggle to adapt to school life, they may experience feelings of worthlessness and a lack of self-confidence and self-esteem, potentially leading to psychological issues such as anxiety, depression, and low self-esteem [35]. Therefore, we hypothesize that school adaptation may also serve as a predictor of self-transcendence values.

The relation among PSMU, self-transcendence values and school adaptation

Drawing on the literature and theories reviewed above, we propose that PSMU, self-transcendence values, and school adaptation cyclically enhance one another (see Fig. 1). Excessive social media use encroaches upon the time individuals allocate for face-to-face social interactions, thereby diminishing their engagement with real-life social support. This reduction can exacerbate feelings of melancholy and alienation, leading to social anxiety and further contributing to negative outcomes such as difficulties in school adaptation [45]. The persistent challenges in school adaptation can, in turn, foster feelings of loneliness and anxiety. This observation aligns with the cognitive-behavioral model. When individuals experience loneliness and anxiety, they may encounter cognitive dissonance, which can result in a decrease in self-transcendence values and subsequently lead to the emergence of problematic social media use tendencies. Furthermore, self-transcendence values can be strengthened through effective self-regulation, which may help mitigate PSMU and the challenges associated with school adaptation. Therefore, the relationship among PSMU, self-transcendence values, and school adaptation is indeed circular.

The current study

In summary, there exists a mutual influence between PSMU and school adaptation. Currently, empirical research on the relationship between PSMU and school adaptation primarily employs cross-sectional methods, failing to explore how they evolve over time. Is it PSMU that affects school adaptation, or do difficulties

in school adaptation lead to PSMU? This question warrants further investigation. Therefore, this study intends to examine the temporal changes between PSMU and school adaptation among college students through longitudinal tracking and cross-lagged panel analysis. Firstly, a cross-lagged panel model is used to test the reciprocal relationship among PSMU, self-transcendence values, and school adaptation. Additionally, six longitudinal mediation models are utilized to further explore whether each of these variables mediates the relationship between the other two. Exploring the aforementioned issues helps to reveal the mechanism among PSMU, self-transcendent values, and school adaptation, providing theoretical and empirical support for the positive social development of college students.

Methods

Participants

Data from a database of longitudinal studies by our research group was used in this study. The participants in the project were recruited from a certain university in Chongqing in China. In the spring of 2020, 2719 college students (861 females, age range = 17–20 years, M age = 17.99, SD age = 1.8) completed the problematic social media use questionnaire, self-transcendence values questionnaire, and Portrait value questionnaire (PVQ) at Time 1 (T1) and at Time 2 (T2). The interval of the two wave of survey is 6 months. Data with missing values, carelessly answered, or errors in entry from the two surveys will be excluded. A total of 2,668 participants (98.12% retention rate, 1370 males, M age = 18, SD age = 1.8) were obtained with valid data from both tests. Research assistants at each school informed participants of the time and place of the study and organized the survey. The current study was approved by the Ethics committee for Scientific Research at the first researcher's university, which was in accordance with the tenets of the Declaration of Helsinki (1991). In addition, all participants signed informed consent forms and were compensated accordingly after the experiment.

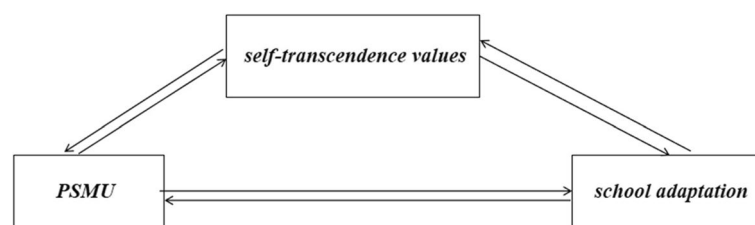


Fig. 1 The proposed cyclical relation among PSMU, self-transcendence values and school adaptation

Measures

PSMU

In this study, WeChat Excessive Use Scale (WEUS) was used to test subjects' PSMU [23]. It includes three dimensions: emotional regulation, salience, and conflict. Items are rated on a Likert scale from "1" ("rare") to "5" ("always"). Participants who scored below the average score (15.0) were assigned to the "non-overuse" (NEU) group. Those who scored between the average score and one standard deviation (15.1 to 21.4) were assigned to the "average use" (AU) group. Participants with scores above 1 criterion and 2 standard deviations from the mean (21.5 to 27.7) were assigned to the "overuse" (EU) group, and participants with scores above 2 standard deviations (>27.7) were assigned to the "severely overused" group (SEU). In this study, the Cronbach's α was 0.95 at time 1 and 0.96 at time 2.

Schwartz values scale

Schwartz Values Scale is preferred to measure the self-transcendence values of the participants [51]. This scale allows the assessment of important values such as social responsibility, empathy and social participation. Self-transcendence is a concept that encourages individuals to go beyond their personal interests in pursuit of higher goals and social responsibilities. Therefore, Schwartz Values Scale was chosen as an appropriate tool to understand self-transcendence values and examine their effects on issues such as school adaptation and PSMU. Each item describes the importance of each value to the individual, and participants were required to rate the extent to which each item resembled them. A 6-point rating scale was employed, ranging from 1 ("Not at all like me") to 6 ("Exactly like me"). Higher scores indicate a greater emphasis on that particular value [46]. In this study, the Cronbach's α was 0.97 at time 1 and 0.97 at time 2.

Chinese college student adaptation scale

The Chinese College Student Adaptation Scale was used to measure the participants' adaptation to university life [19]. It consists of seven dimensions: interpersonal adaptation, academic adaptation, career adaptation, self-adaptation, campus adaptation, emotional adaptation, and satisfaction. The first six dimensions each include two sub-dimensions, which assess both the current status and adjustment in these areas. Participants were asked to indicate the extent to which they agreed or disagreed with the statements in the scale, with response options on a 5-point scale: 1 (Strongly Disagree)—5 (Strongly Agree). For the purpose of statistical analysis, reverse-coding was applied to certain items, where higher scores indicate better adaptation. In this study, the Cronbach's α was 0.93 at time 1 and 0.93 at time 2.

Data analysis

All data were analyzed using SPSS 24.0 and Mplus 8.0. First, descriptive statistics and correlations among variables were calculated. Second, the measurement model for PSMU, self-transcendence values, and school adaptation was tested using confirmatory factor analysis (CFA) in Mplus 8.0. Additionally, the longitudinal invariance of PSMU, self-transcendence values, and school adaptation was evaluated through configural, metric, scalar, and strict invariances. The method of fitting index difference test was employed to assess measurement equivalence [1]. Third, a cross-lagged model was employed to investigate the longitudinal relationship between PSMU, self-transcendence values, and school adjustment. Fourth, Mplus 8.0 software was utilized to construct a structural equation model, applying the maximum likelihood estimation method to estimate model parameters. The significance level was set at $\alpha=0.05$ (two-sided), with a $p<0.05$ indicating statistical significance. Structural equation modeling was employed to examine whether self-transcendence values mediated the effect of PSMU at time 1 (T1) on school adjustment at time 2 (T2) (Model 1), as well as the effect of school adjustment at T1 on PSMU at T2 (model 2). Additionally, it assessed whether PSMU moderated the effect of self-transcendence values at T1 on school adjustment at T2 (Model 3), and whether school adjustment at T1 influenced self-transcendence values at T2 (Model 4). This study also explored whether school adjustment mediated the effect of PSMU at T1 on self-transcendence values at T2 (Model 5), and the effect of self-transcendence values at T1 on PSMU at T2 (Model 6) [3]. We adopted maximum likelihood with robustness (MLR) as the estimation method, which can handle missing data and is robust for both normal and non-normal distributions [39, 40]. A model is considered acceptable when the values of the Tucker-Lewis index (TLI) and comparative fit index (CFI) exceed 0.90, while the standardized root mean square residual (SRMR) and root mean square error of approximation (RMSEA) values are below 0.08 [24]. Additionally, the 95% bias-corrected bootstrapping methods were employed to estimate the magnitude of the mediating effects.

Results

Preliminary analysis

Table 1 presents the means, standard deviations (SDs), and correlations of the study variables, including the correlation coefficients between PSMU, self-transcendence values and school adaptation at both Time 1 and Time 2. Notably, significant correlations were found among PSMU, self-transcendence values, and school adaptation (refer to Table 1). Furthermore, no age differences were observed across all variables.

Table 1 Descriptive statistics and correlations among research variables ($n = 2668$)

Variables	Mean \pm SD	1	2	3	4	5	6
1. PSMU T1	1.87 \pm 1.34	1	.05*	-.74***	-.11***	-.71***	-.05*
2. PSMU T2	2.48 \pm 0.94		1	-.11***	-.06***	-.12***	-.16***
3. Self-transcendence values T1	3.78 \pm .2.27			1	.05*	.94***	.05*
4. Self-transcendence values T2	4.99 \pm 0.88				1	.15**	.41***
5. School adaptation T1	2.65 \pm 1.57					1	.06*
6. School adaptation T2	3.50 \pm 0.51						1

1 = Time 1; 2 = Time 2

* $p < .05$; ** $p < .01$; *** $p < .001$

Measurement model and longitudinal measurement invariance

Based on the recommended criteria of $RMSEA < 0.05$, $SRMR < 0.05$, $\Delta CFI < 0.01$ and $\Delta TLI < 0.01$ for difference tests, all models of invariance satisfied the stringent standards for Metric invariance. Detailed information is presented in Table 2.

Cross-lagged model

According to the model fit information, the three-factor measurement model encompassing PSMU, self-transcendence values, and school adaptation demonstrated a good fit: $\chi^2 = 613$, $df = 12$, $p < 0.001$, $RMSEA = 0.00$, $CFI = 1.00$, $TLI = 1.00$, $SRMR = 0.00$ (see Fig. 2). The results indicated that the relationship between PSMU and self-transcendence values, as well as the connection between self-transcendence values and school adaptation, were reciprocal.

Testing for mediating effect

The mediation model fitted the data well (Model 1–Model 6, Model 1 $\chi^2 = 527.089$, $df = 29$, $CFI = 0.98$, $TLI = 0.98$, $RMSEA = 0.00$, $SRMR = 0.02$; Model 2 $\chi^2 = 236.670$, $df = 29$, $CFI = 0.99$, $TLI = 0.98$, $RMSEA = 0.00$, $SRMR = 0.03$; Model 3 $\chi^2 = 649.601$, $df = 29$, $CFI = 0.99$, $TLI = 0.99$, $RMSEA = 0.00$, $SRMR = 0.00$; Model 4 $\chi^2 = 322.084$, $df = 29$, $CFI = 0.98$, $TLI = 0.98$, $RMSEA = 0.01$, $SRMR = 0.01$; Model 5 $\chi^2 = 478.305$, $df = 29$, $CFI = 0.98$, $TLI = 0.98$, $RMSEA = 0.01$, $SRMR = 0.00$; Model 6 $\chi^2 = 226.942$, $df = 29$, $CFI = 0.99$, $TLI = 0.99$, $RMSEA = 0.02$, $SRMR = 0.01$, see Table 3 and Fig. 3). The 95% bias-corrected bootstrapping showed the indirect effects were significant, after controlling for gender, age.

Discussion

The primary aims of the present study were to examine the longitudinal relationship between PSMU, self-transcendence values, and school adaptation, as well as to explore the underlying mediation mechanisms of their

Table 2 Model fit indices for analysis of longitudinal measure invariance of variables ($n = 2668$)

Invariance tests	χ^2	df	CFI	ΔCFI	TLI	ΔTLI	RMSEA	SRMR
PSMU								
Configural invariance	17.546*	11	0.999		0.999		0.015	0.010
Metric invariance	18.433*	13	0.999	0.000	0.999	0.000	0.013	0.011
Scalar invariance	76.390*	16	0.994	0.005	0.992	0.007	0.038	0.017
Strict Invariance	136.139*	19	0.989	0.005	0.987	0.005	0.048	0.020
Self-transcendence values								
Configural invariance	641.831*	47	0.977		0.967		0.039	0.014
Metric invariance	701.474*	52	0.974	0.003	0.968	0.001	0.048	0.019
Scalar invariance	867.314*	58	0.968	0.006	0.964	0.004	0.072	0.075
Strict Invariance	925.515*	64	0.966	0.002	0.965	0.001	0.071	0.075
School adaptation								
Configural invariance	6643.496*	285	0.999		0.971		0.041	0.041
Metric invariance	6637.982*	297	0.990	0.009	0.981	0.010	0.049	0.041
Scalar invariance	6802.515*	310	0.995	0.005	0.985	0.004	0.089	0.062
Strict Invariance	7143.415*	323	0.985	0.010	0.983	0.002	0.089	0.065

* $p < .05$; ** $p < .01$; *** $p < .001$

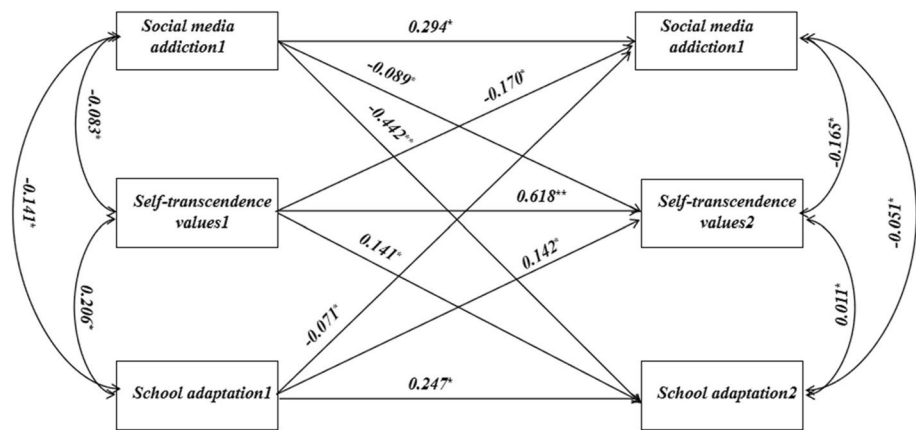


Fig. 2 Standardized structural model of longitudinal cross-lagged panel analysis. Note: All the parameters are standardized. 1=Time 1; 2=Time 2

Table 3 The fit indicates of mediation models

model	χ^2	df	CFI	TLI	RMSEA	SRMR
Model 1	527.089	29	0.98	0.98	0.00	0.02
Model 2	236.670	29	0.99	0.98	0.00	0.03
Model 3	649.601	29	0.99	0.99	0.00	0.00
Model 4	322.084	29	0.98	0.98	0.01	0.01
Model 5	478.305	29	0.98	0.98	0.01	0.00
Model 6	226.942	29	0.99	0.99	0.02	0.01

mutual associations. To date, we are unaware of any studies that have directly investigated the relationships among PSMU, self-transcendence values, and school adaptation. Therefore, these findings contribute novel insights to the existing body of knowledge in this field.

Longitudinal relation between PSMU and school adaptation

The results demonstrated a reciprocal relationship between PSMU and school adaptation. The finding that PSMU predicts school adaptation is consistent with previous cross-sectional studies [48, 52]. Prior research has indicated a significant negative correlation between college students' school adaptation and PSMU [13]. Several explanations exist for the relationship between PSMU and school adaptation. First, self-worth theory can elucidate this outcome. When college students struggle to meet their needs in real life due to perceived deficiencies, they may experience anxiety. In an attempt to bridge these gaps, they often turn to social media, which intensifies their desire for usage. However, excessive engagement with social media can adversely affect college students. Upon realizing that instead of fulfilling their real-life needs, they have missed out on even more information through media, students may experience

a decline in self-worth and cognitive dissonance. This, in turn, can exacerbate emotional suppression and ultimately impede their ability to adapt to school. Additionally, irrational use of social media encroaches on time that could be spent on real-life social activities, thereby weakening individuals' social connections. The relationships formed through social media tend to be superficial and weak. Prolonged indulgence in these platforms can heighten feelings of melancholy and alienation, leading to social anxiety and ultimately hindering school adaptation [7, 9]. Second, the findings align with the Conservation of Resources (COR) theory [22], which posits that individuals possess limited resources—such as time, energy, emotions, and attention—and strive to acquire, conserve, and maintain these resources. When college freshmen allocate a substantial portion of their resources to online gaming, the resources available for managing real-life challenges become severely limited or even insufficient, leaving them with inadequate time to focus on their academic studies. This misallocation can lead to a decline in academic performance, potentially resulting in failing multiple courses, which further exacerbates their disconnection from reality and complicates their adaptation to school life. Furthermore, the self-determination theory highlights the importance of autonomy in individuals'

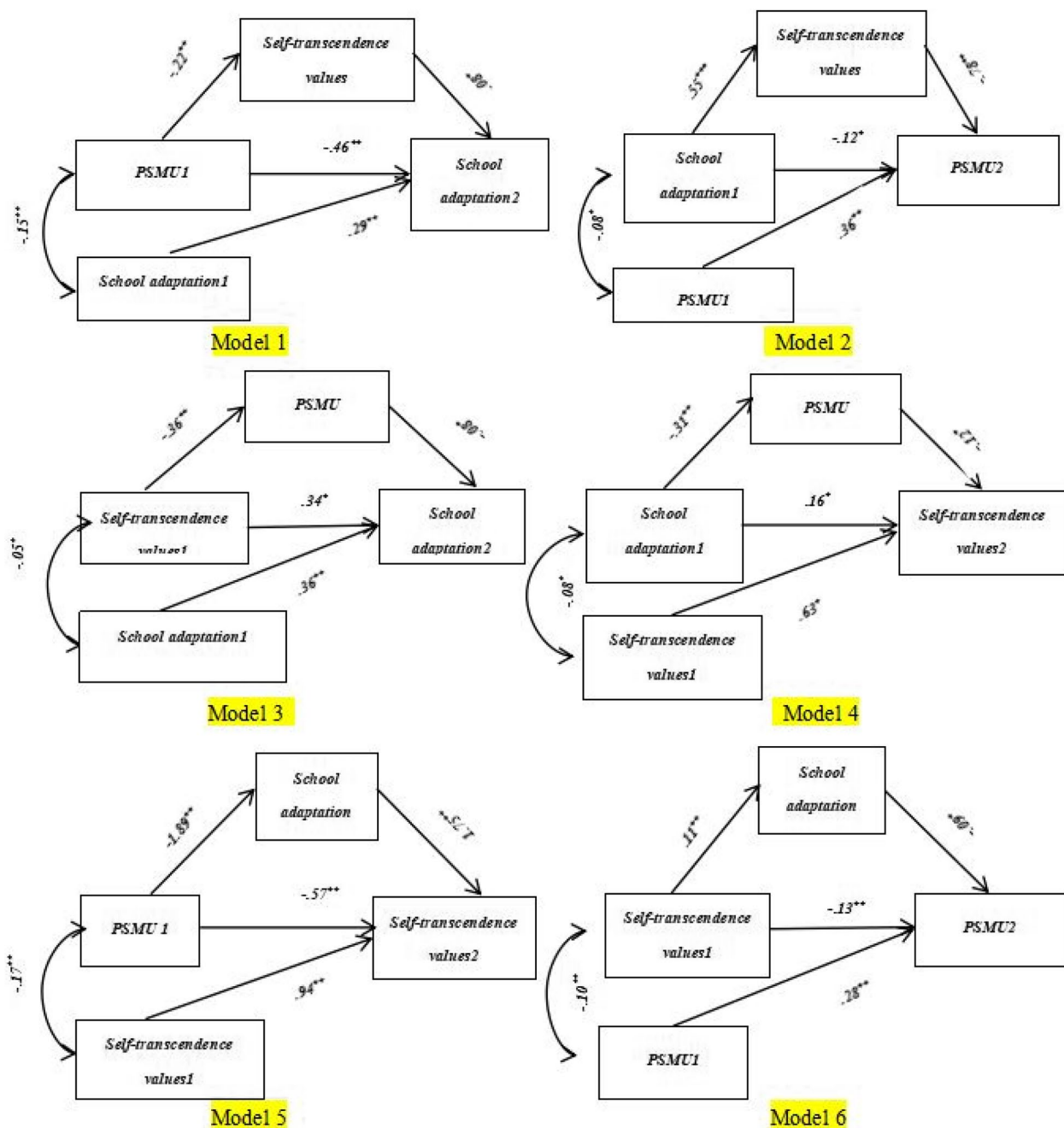


Fig. 3 The mediated model with standardized path coefficients. Note: 1 = Time 1, 2 = Time 2; *** $p < .001$; ** $p < .01$; * $p < .05$

behavior and decision-making processes [2]. PSMU may be linked to this need for autonomy, as individuals can independently choose when to engage with social media, whom to interact with, and what content to share. However, if PSMU results in individuals losing control over their behaviors, it can undermine their autonomy, making it challenging for them to concentrate on their studies and meet the demands of academic life [11, 38].

In addition, school adaptation can predict PSMU six months later. These results suggest a possible reciprocal relationship between PSMU and school adaptation, indicating that this reciprocal influence may create a cycle of developing and maintaining PSMU behaviors. Specifically, a study has found that social adaptation directly impacts the tendency of college students toward PSMU [58]. Beyond environmental adaptation, maladaptation to

role transitions serves as a catalyst for the development of PSMU [36]. Although the mutual relationship between PSMU and school adaptation has not been extensively studied, this perspective aligns with the Compensation for Deficiencies Theory and the tension reduction hypothesis [20, 54], PSMU is viewed as a compensatory behavior that arises when individual development is hindered. If college students are unable to satisfy their basic psychological needs during the adaptation phase, they are likely to seek compensation through internet use, ultimately leading to PSMU. Vaish et al. proposed the "tension reduction hypothesis" of internet addiction, which posits that PSMU is closely related to coping with real-life stress. Current research has also found that individuals with poor social adaptation often exhibit low self-esteem and diminished self-identity, and this psychological state may drive them to utilize mobile social networks to foster positive self-esteem and enhance their self-identity. Consequently, difficulty in school adaptation emerges as a significant factor influencing PSMU among college students.

The longitudinal relation between PSMU and self-transcendence values

The present study revealed that individuals with high levels of PSMU are more susceptible to developing negative self-perceptions and low self-transcendence values, which subsequently contribute to the further reinforcement of their PSMU. Specifically, negative self-perceptions and low self-transcendence values are not merely consequences of PSMU; they also play a significant role in reinforcing and exacerbating it. These findings contribute to the existing body of research by elucidating the bidirectional relationship between PSMU and self-transcendence values.

Our findings support the hypothesis that PSMU can predict negative self-perceptions and low self-transcendence values over time. Indirect evidence corroborates this result. A study indicated that individuals with high levels of PSMU were more likely to develop negative self-perceptions [30, 69]. This relationship aligns with the social cognitive learning theory model. Specifically, PSMU can lead individuals to form cognitive structures or scripts related to negative self-perceptions and self-transcendence values through observational learning [10]. When individuals encounter situations that trigger negative self-perceptions, these negative scripts are automatically activated, potentially eliciting anxiety and unease, which can adversely affect the individual's mental health [68]. This anxiety and unease may cause individuals to become overly focused on themselves, thereby neglecting higher-level values. In line with the principles of the I-PACE model, it is posited that affective-cognitive responses act

as mediating factors in PSMU. Perceived stress stemming from abnormal emotions, such as depression or anxiety, may influence cognitive processes, ultimately leading to excessive internet use [8]. When individuals become overly concerned with their image and the evaluations of others, they may overlook their intrinsic values and goals, consequently diminishing the significance of self-transcendence. This preoccupation can also result in a neglect of responsibilities and missions in real life, further undermining the value of self-transcendence.

Furthermore, negative self-perceptions and low self-transcendence values resulting from PSMU can create a reinforcing cycle. The connection between PSMU and self-transcendence can be elucidated through self-escape theory [6]. When individuals recognize the gap between their current circumstances and their expectations, they often seek to escape from self-awareness to mitigate negative emotions [56]. Social media addicts become engrossed in the virtual world as a means of escaping the painful realities of their lives, thereby neglecting the social relationships fostered through traditional interpersonal interactions. This neglect can diminish the intimacy of individual relationships [63], leading to interpersonal disharmony, distress, loneliness, and other issues that further impede students' adaptation to school [33].

The longitudinal relation between self-transcendence values and school adaptation

Self-transcendence values and school adaptation mutually influence one another. On one hand, levels of self-transcendence values can predict subsequent effects on school adaptation, consistent with previous cross-sectional studies. Research indicates that children and adolescents with lower self-transcendence values are more likely to exhibit negative behaviors associated with school adaptation [18]. Self-worth is a significant predictor of school adaptation; higher self-worth correlates with improved levels of school adaptation. The theory of self-worth, proposed by American educational psychologist Covington, posits that children's motivation for learning and their learning behaviors are influenced by their self-worth. In essence, self-worth is a notable predictor of school adaptation, with increased self-worth leading to enhanced school adaptation levels for individuals [61]. Furthermore, self-transcendence values are associated with an individual's self-awareness and self-management capabilities. When individuals prioritize self-transcendence, they tend to focus more on their learning and growth, actively managing their time and energy. This enhanced self-awareness and management ability can aid them in coping with challenges and pressures in school, thereby improving their school adaptation skills [31]. Additionally, self-worth is a component of positive

psychological capital, characterized by distinct positive, active, and constructive traits. The level of positive psychological capital positively predicts school adaptation; thus, higher levels correspond to better school adaptation outcomes. This suggests that students with higher self-worth experience fewer issues related to school adaptation and demonstrate stronger adaptation capabilities [28]. Internal individual factors can also predict social adaptability; students with robust self-worth possess higher levels of positive psychological capital, which fosters positive emotions and psychological resilience. These students are more likely to adopt optimistic strategies for overcoming challenges in their development, leading to improved adaptation to the school environment. This perspective aligns with Maslow's hierarchy of needs theory, which posits that certain aspects of self-worth must be realized by individuals, rather than provided by society or others [25].

On the other hand, school adaptation is a predictor of self-transcendence values six months later, suggesting a significant association between school adaptation and future self-transcendence values. This phenomenon can be elucidated through three key aspects. Firstly, students who adapt well to their school environment typically possess enhanced psychological and social skills, which may facilitate the development of a positive mindset and self-transcendence values when confronted with challenges and pressures [34]. Students who adapt well to school typically exhibit high levels of self-esteem and self-confidence, enabling them to actively confront the challenges of learning and life. Consequently, they demonstrate enhanced abilities in self-awareness and self-management [28]. This positive mindset, along with self-transcendence values, fosters greater motivation and perseverance in the face of difficulties, aiding in the achievement of personal goals and values. Furthermore, students who adapt successfully to school often possess a heightened motivation to learn and develop. They are inclined to set clear academic and career objectives and diligently work towards accomplishing them. This goal orientation is closely linked to the concept of self-transcendence values, which emphasize continuous improvement and the pursuit of higher aspirations. As a result, students who adapt well to school are more likely to demonstrate a stronger willingness and propensity for self-transcendence in the future. Additionally, these students tend to possess stronger social skills, facilitating the development of self-transcendence values through their interactions with others. With effective interpersonal skills, they are more likely to forge positive relationships with peers and teachers. Such healthy social connections can enhance an individual's social skills and

self-confidence, thereby encouraging a greater emphasis on self-transcendence and personal growth.

The cyclical relation between PSMU, self-transcendence values and school adaptation

The mediation models further support the cyclical relationship between PSMU, self-transcendence values, and school adaptation. These factors not only serve as outcomes of one another but also act as significant antecedents. PSMU can potentially influence school adaptation, which, in turn, may affect both PSMU and self-transcendence values. Concurrently, self-transcendence values may positively impact school adaptation, while PSMU may undermine self-transcendence values. This cycle can either exacerbate or mitigate students' interactions between school and social media, ultimately influencing their psychological well-being and development. Therefore, understanding these interrelationships and providing support and education to help students achieve balance and healthy development in these areas is crucial.

As revealed by the cognitive-behavioral model, the interplay of media use and negative emotions and cognitions can induce cognitive dissonance in individuals, potentially leading to behavioral or adaptive issues [47]. In daily life, if university students consistently dwell on missed information from others and frequently use social media in hopes of finding emotional comfort without success, this not only fails to alleviate their negative emotions but also intensifies their painful experiences, adversely affecting their adaptability.

Limitations and contributions

Although we obtained some useful findings, there were several limitations to this study that require attention. First, the time interval selected is an important aspect of longitudinal research, and different timings of assessments have different influences on the efficiency and accuracy of parameter estimation [49]. The time interval in this study was only 6 months, and there were only two-time points for the survey. To construct a comprehensive longitudinal mediation model and thoroughly test the underlying assumptions, future research should extend the time interval and increase the number of time points. Long-term follow-up studies with repeated assessments, such as autoregressive cross-lagged panel designs, will be beneficial in examining the causal relationship between PSMU and school adaptation. Second, this study relied solely on a questionnaire method for data collection. Multimethod approaches are generally more effective for hypothesis testing; therefore, incorporating additional methods such as experiments, interviews, surveys, and interventions may provide a more robust means of replicating the results. Finally, this study's small sample size,

comprised entirely of Chinese college students, limits the generalizability of the findings, even though the results align with previous research. Future studies with larger sample sizes are recommended to validate the current findings.

Despite the aforementioned limitations, this study offers several theoretical and practical contributions. Theoretically, we extend prior research on the relationship between PSMU, self-transcendence values, and school adaptation by investigating their interrelatedness through a longitudinal cross-lagged model, thereby revealing their cyclical connection. Practically, our findings suggest implications for preventing difficulties related to school adaptation. Specifically, considering the mutual influences of PSMU, self-transcendence values, and school adaptation, it is crucial to implement effective strategies to disrupt this cycle. First, schools should play a significant role in cultivating moral values and talents. Educational curricula ought to instruct students on the proper use of social media, establish guidelines for problem-solving, foster cognitive development, and mitigate the risk of addiction. Furthermore, teachers must continuously and consciously enhance their educational and pedagogical skills. Schools should actively encourage educators to innovate their teaching methods, fully engage students' initiative, and transform campus life into a meaningful period for students to immerse themselves in knowledge. Additionally, it is vital to create a united front among teachers, class supervisors, counselors, and peers. Encouraging college students to foster opportunities for peer interaction can guide them in altering detrimental communication habits, mastering effective conflict resolution strategies, reducing the risk of PSMU, and establishing positive peer relationships, which in turn can enhance their self-esteem and sense of self-worth.

Conclusion

In summary, we further examined the longitudinal relationship between PSMU, self-transcendence values, and school adaptation, finding that these relationships are mutually influential. Additionally, we employed six mediation models to investigate their cyclical relationship using longitudinal sample data. This provides evidence for the circular link between addiction, cognitive factors (self-transcendence values), and adaptive capacity within the frameworks of self-worth and self-determination theory. Consequently, universities should implement targeted mental health education that addresses the basic information and daily experiences of university students, ensuring timely psychological

counseling for those exhibiting anxiety. Furthermore, universities should organize psychological lectures to equip students with effective strategies for enhancing their self-transcendence values, thereby mitigating excessive PSMU and its impact on adaptability. Finally, universities should take steps to reduce inappropriate social media usage among students to prevent and alleviate issues related to negative school adaptation.

Abbreviations

CFI	Comparative Fit Index
TLI	Tucker-Lewis
RMSEA	Root Mean Square Error of Approximation
SRMR	Standardized Root Mean Square Residual

Acknowledgements

Not applicable.

Authors' contributions

Li took charge of the conceptualization, data curation, formal analysis, methodology, visualization and writing-original draft. Xie took charge of the data curation and writing-review & editing. Shan took charge of investigation, supervision, validation. Chen took charge of the funding acquisition, project administration, resources and supervision. All authors read and approved the manuscript and all data were generated in-house and that no paper mill was used.

Funding

This research was supported by the Fundamental Research Funds for the Central Universities (2022CDJSKZX07), Project of Chongqing Municipal Programs for Social Science (2021ZTZD10), Project of the Chongqing Municipal Committee of Science and Technology (cstc2021jsyj-zzysbAX0076), Graduate Scientific Research and Innovation Foundation of Chongqing (CYB23007), College Ideological and Political Work Cultivation Project of the Ministry of Education (JSZS2021-2), Project of the China Association of Higher Education (2020FDD07), Projects of the Chongqing Municipal Education Commission of China (19SKZDZX13 and 19SKSZ001), Fundamental Research Funds for the Central Universities (2018CDJSK01XK04), and Project of Chongqing graduate teaching reform(yjg242003).

Data availability

The datasets generated and/or analysed during the current study are not publicly available due [REASON WHY DATA ARE NOT PUBLIC] but are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

This study was conducted by the ethical principles and guidance from the ethical committee. The current study was approved by the Ethics committee for Scientific Research at the first researcher's university, which was in accordance with the tenets of the Declaration of Helsinki (1991). Further, informed consent was obtained from the individuals who participated in this study.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Received: 12 September 2024 Accepted: 6 January 2025
Published online: 24 January 2025

References

- Meade AW, Johnson EC, Braddy PW. Power and sensitivity of alternative fit indices in tests of measurement invariance. *J Appl Psychol*. 2008. <https://doi.org/10.1037/0021-9010.93.3.568>.
- Al-Gamal E, Alzayyat A, Ahmad MM. Prevalence of internet addiction and its association with psychological distress and coping strategies among University Students in Jordan. *Perspect Psychiatr Care*. 2016;49–61. <https://doi.org/10.1111/ppc.12102>.
- Anderson CA, Gentile DA, Buckley KE. Violent video game effects on children and adolescents: theory, research, and public policy. *Policy*. 2008. <https://doi.org/10.1093/acprof:oso/9780195309836.001.0001>.
- Andreassen CS, Billieux J, Griffiths MD, Kuss D, Demetrovics Z, Mazzoni E, Pallesen S. The relationship between addictive use of social media and video games and symptoms of psychiatric disorders: A large-scale cross-sectional study. *Psychol Addict Behav*. 2016;30(2):252–62. <https://doi.org/10.1037/adb0000160>.
- Aydn O, Obua F, Boz C, Nal-Aydn P. Associations between executive functions and problematic social networking sites use. *J Clin Exp Neuropsychol*. 2020;42(6):634–45. <https://doi.org/10.1080/13803395.2020.1798358>.
- Baumeister RF. Suicide as escape from self. *Psychol Rev*. 1990;97(1):90–113. <https://doi.org/10.1037/0033-295X.97.1.90>.
- Brand M. Can internet use become addictive? *Science (New York, N.Y.)*. 2022;376(6595):798–799. <https://doi.org/10.1126/science.abn4189>.
- Brand M, Young K, Laier C. Integrating psychological and neurobiological considerations regarding the development and maintenance of specific Internet-use disorders: an interaction of Person-Affect-Cognition-Execution (I-PACE) model. *Neurosci Biobehav Rev*. 2016;71:252–66. <https://doi.org/10.1016/j.neubiorev.2016.08.033>.
- Brand M, Wegmann E, Stark R, Mueller A, Woelfling K, Robbins TW, Potenza MN. The Interaction of Person-Affect-Cognition-Execution (I-PACE) model for addictive behaviors: update, generalization to addictive behaviors beyond internet-use disorders, and specification of the process character of addictive behaviors. *Neuroscience and Biobehavioral Reviews*(104-). 2019:104. <https://doi.org/10.1016/j.neubiorev.2019.06.032>.
- Buckley KE, Anderson CA. A theoretical model of the effects and consequences of playing video games. s. Chapter. In: Vorderer P, Bryant J, editors. *Playing video games - motives, responses, and consequences*. Mahwah: LEA; 2006. p. 363–78.
- Burhan R, Moradzadeh J. Neurotransmitter Dopamine (DA) and its role in the development of social media addiction. *J Neurol Neurophysiol*. 2020;11(7):1–2.
- Cheng Xue Yao. Psychometric properties of the 10-item Connor-Davidson Resilience Scale (CD-RISC-10) in Chinese undergraduates and depressive patients. *J Affect Disord*. 2020;261. <https://doi.org/10.1016/j.jad.2019.10.018>.
- Chu P, Gao F, Wang P, Tian Y, Zhang L, Han P. The relationship between internet addiction disorder and coping strategies among college freshmen: a cross-lagged regression analysis. *Chin J Spec Educ*. 2016;9(7):7.
- Çiçek İ, Şanlı ME, Gökmen A, Yıldırım M. Problematic social media use, satisfaction with life, and levels of depressive symptoms in university students during the COVID-19 pandemic: mediation role of social support. *Psihologija*. 2024;57(2). <https://doi.org/10.2298/PSI220613009C>.
- Çiçek İ, Tanrıverdi S, Şanlı ME, Bulus M. Parental attitudes and socio-demographic factors as predictors of smartphone addiction in university students. *Medu Akad*. 2021. <https://doi.org/10.52380/ijpes.2021.8.2.430>.
- Covington MV. Self-worth theory and the achievement process; 1984.
- Covington MV. Making the grade: a self-worth perspective on motivation and school reform. 1992. <https://doi.org/10.1017/CBO9781139173582>.
- Li D, Zhou T, Liu J, Dai Y, Chen M, Chen X. Values of adolescent across regions in China: relations with social, school, and psychological adjustment. *J Psychol Sci*. 2018;41(6):10.
- Fang X, Wo J, Lin X. Development of chinese college student adjustment scale. *Stud Psychol Behav*. 2005;3(2):95–101.
- Gao W, Zhiyan C. A study on psychopathology and psychotherapy of internet addiction. *Adv Psychol Sci*. 2006;14(4):596–603.
- Heatherton TF, Wagner DD. Cognitive neuroscience of self-regulation failure. *Trends Cogn Sci*. 2011;15(3):132–9. <https://doi.org/10.1016/j.tics.2010.12.005>.
- Hobfoll SE. Conservation of resources. A new attempt at conceptualizing stress. *Am Psychol*. 1989;44(3):513. <https://doi.org/10.1037//0003-066X.44.3.513>.
- Hou J, Ndasauka Y, Jiang Y, Ye Z, Wang Y, Yang L, Zhang X. Excessive use of WeChat, social interaction and locus of control among college students in China. *PLOS ONE*. 2017;12(8):e0183633. <https://doi.org/10.1371/journal.pone.0183633>.
- Hu L-T, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Struct Equ Model*. 1999;6(1):1–55. <https://doi.org/10.1080/10705519909540118>.
- Wanzhong Hu. Talking about human values and self-worth from Maslow's theory of needs. *Nanjing J Soc Sci*. 2000;6:26–30.
- Jiang Y, Bai H, Bai X, Qi S, Wu Y. Research on characteristics of attentional bias in the problematic mobile social network usebehavior. *Chin J Drug Depend*. 2019;5:6.
- Junco R, Cotton SR. No A 4 U: The relationship between multitasking and academic performance. *Comput Educ*. 2012;59. <https://doi.org/10.1016/j.compedu.2011.12.023>.
- Liao J. The influence of university freshmen's positive psychological capital on school adaptation. *Occup Health*. 2019;35(1):e0169839.
- Juvonen J, Kogachi K, Graham S. When and how do students benefit from ethnic diversity in middle school? *Child Dev*. 2017. <https://doi.org/10.1111/cdev.12834>.
- Ko T, Turan AH. The relationships among social media intensity, smartphone addiction, and subjective wellbeing of Turkish college students. *Applied Research in Quality of Life*. 2020;16(4):1999–2021. <https://doi.org/10.1007/s11482-020-09857-8>.
- Kolaric VM, Vukicevic VB. Cultural policy of Yugoslav self-management: conceptual and value bases and modalities. *Revista Publicando, Inc*; 2020. p. 23.
- Larose R, Eastin MS, Gregg J. Reformulating the internet paradox: social cognitive explanations of internet use and depression. *J Online Behav*. 2001;1(2).
- Liao H-Y, Zhong Y-H, Wang R-R, Tang H. Mobile phone addiction, self-esteem, shyness and interpersonal communication disturbance. *Chin J Clin Psychol*. 2016;24.
- Li D, Guo Y, Lin Z, Tu M, Jin S. Fluid self-worth: the compensatory role of online social interaction. *Child Youth Serv Rev*. 2020. <https://doi.org/10.1016/j.childyouth.2020.105536>.
- Liu D, Kirschner PA, Karpinski AC. A meta-analysis of the relationship of academic performance and Social Network Site use among adolescents and young adults. *Comput Hum Behav*. 2017;77:148–57. <https://doi.org/10.1016/j.chb.2017.08.039>.
- Liu C, Chen Y. Survey on internet dependence and psychological analysis of college students—taking the survey on internet addiction of students in Renmin University of China as an example. *China Youth Studies*; 2009.
- Meshi D, Ellithorpe ME. Problematic social media use and social support received in real-life versus on social media: Associations with depression, anxiety and social isolation. *Addict Behav*. 2021. <https://doi.org/10.1016/j.addbeh.2021.106949>.
- Makalesi A, Article R, Bilal H, RM, Niversitesi E. A research on social media addiction and dopamine driven feedback. 2019. <https://doi.org/10.30798/makuiibf.435845>.
- Maydeu-Olivares A. Maximum likelihood estimation of structural equation models for continuous data: standard errors and goodness of fit. *Struct Equ Model*. 2017;24(3–4):383–94. <https://doi.org/10.1080/10705511.2016.1269606>.
- Maydeu-Olivares A, Bckenholt U. Structural equation modeling of paired-comparison and ranking data. *Psychol Methods*. 2005;10(3):285–304. <https://doi.org/10.1037/1082-989X.10.3.285>.
- Huang N, Xin T, Li X-X. The classification and discriminate of school adjustment. *Psychol Dev Educ*. 2007;23(2):6.
- Oberst U, Wegmann E, Stodt B, Brand M, Chamarro A. Negative consequences from heavy social networking in adolescents: the mediating role of fear of missing out. *J Adolesc*. 2017;55:51–60. <https://doi.org/10.1016/j.adolescence.2016.12.008>.
- Oh I, Song J. Mediating effect of emotional/behavioral problems and academic competence between parental abuse/neglect and school adjustment. *Child Abuse Negl*. 2017;50145213417302338. <https://doi.org/10.1016/j.chiabu.2017.06.007>.

44. Oh J, An J. Depressive symptoms, emotional aggression, school adjustment, and mobile phone dependency among adolescents with allergic diseases in South Korea. *J Pediatr Nurs*. 2019. <https://doi.org/10.1016/j.pedn.2019.04.010>.
45. Orzech KM, Grandner MA, Roane BM, Carskadon MA. Digital media use in the 2 h before bedtime is associated with sleep variables in university students. *Comput Hum Behav*. 2016;55:43–50. <https://doi.org/10.1016/j.chb.2015.08.049>.
46. Paez J, De-Juanas A. Validation of “Schwartz Values Scale” for spanish adolescents population. *Procedia Soc Behav Sci*. 2015;165:195–201. <https://doi.org/10.1016/j.sbspro.2014.12.622>.
47. Qi Li, Jianing Wang, Siqi Zhao, Yanru J. Validity and reliability of the chinese version of the fear of missing out scale in college students. *Chin Ment Health J*. 2019;33(4):312–7.
48. Qin Y, Hu C. The relationship between social media use and cognitive failures, sleep quality of middle and primary school security guard. 2023.
49. Rucker DD, Mcshane BB, Preacher KJ. A researcher’s guide to regression, discretization, and median splits of continuous variables. *J Consum Psychol*. 2015;666–678. <https://doi.org/10.1016/j.jcps.2015.04.004>.
50. Ryan RM, Deci EL. An overview of self-determination theory: An organismic dialectical perspective. In: Deci EL, Ryan RM, editors. *Handbook of self-determination research*. University of Rochester Press; 2002. p. 3–33.
51. Schwartz SH, Cieciuch J, Vecchione M, Davidov E, Konty M. Refining the theory of basic individual values. 2012. <https://doi.org/10.1037/a0029393>.
52. Tsitsikashvili KP, Kremen S. Instagram addiction of school students as a factor of social deadadaptation. 2019. <https://doi.org/10.33910/herzenpsyc onf-2019-2-89>.
53. Tus J, Espiritu N, Dianito AJ, Mohamitano A. Social media addiction and depression among filipino senior high school students during the COVID-19 pandemic. *Int J Psychol Couns*. 2021;11(3):181–92.
54. Vaish PS, Dey B, Pathak A. Internet use pattern, coping styles and quality of life: Is there a relationship? *Ind J Health Wellbeing*. 2015;5(12):1463–7.
55. Vernon L, Barber BL, Modecki KL. Adolescent problematic social networking and school experiences: the mediating effects of sleep disruptions and sleep quality. *Cyberpsychol Behav Soc Netw*. 2015;18(7):386–92. <https://doi.org/10.1089/cyber.2015.0107>.
56. Walburg V, Mialhes A, Moncla D. Does school-related burnout influence problematic facebook use? *Child Youth Serv Rev*. 2016;61:327–31. <https://doi.org/10.1016/j.childyouth.2016.01.009>.
57. Weihua F, Cathy W. The mediating role of student motivation in the linking of perceived school climate and achievement in reading and mathematics. *Front Educ*. 2018;3:50. <https://doi.org/10.3389/educ.2018.00050>.
58. Xianxue YUAN, Jiansheng LI. Researches on the relationship between social adaptation abilities personality traits and internet addition. *Chin J Appl Psychol*. 2006;12(3):5.
59. Zhang X, Huang PF, Li BQ, Xu WJ, Li W, Zhou B. The influence of interpersonal relationships on school adaptation among Chinese University students during COVID-19 control period: Multiple mediating roles of social support and resilience - ScienceDirect. *J Affect Disord*. 2021;285:97–104. <https://doi.org/10.1016/j.jad.2021.02.040>.
60. Yang Y. On the relationship between internet addiction and school adaptation difficulties among freshmen. *China J Multimedia Netw Teach*. 2023;6:113–6.
61. Ye Z, Zhao G, Wu K, Xia L. Positive youth development and school adaptation among adolescents in China: a multigroup latent profile analysis. *J Beijing Norm Univ (Social Sciences)*. 2017;6:23–31.
62. Yee N. The demographics, motivations, and derived experiences of users of massively multi-user online graphical environments. *Presence*. 2006;15(3):309–29. <https://doi.org/10.1162/pres.15.3.309>.
63. Yeh YC, Huei-Chen KO, Jo Yung-Wei WU, Cheng CP. Gender differences in relationships of actual and virtual social support to internet addiction mediated through depressive symptoms among college students in Taiwan. *Cyberpsychol Behav*. 2008;11(4):485–7. <https://doi.org/10.1089/cpb.2007.0134>.
64. Yıldırım M, Çiçek İ. Fear of COVID-19 and smartphone addiction among Turkish adolescents: mitigating role of resilience. *Fam J (Alexandria, Va.)*. 2022. <https://doi.org/10.1177/10664807221139510>.
65. Yıldırım M, Çiçek İ, Öztekin GG, Aziz IA, Hu J. Associations between problematic social media use and psychological adjustment in Turkish adolescents: mediating roles of family relationships. *Int J Ment Heal Addict*. 2023. <https://doi.org/10.1007/s11469-023-01138-3>.
66. Yin L, Wang P, Nie J, Guo J, Feng J, Lei L. Social networking sites addiction and FoMO: the mediating role of envy and the moderating role of need to belong. *Curr Psychol*. 2021;8(8):40. <https://doi.org/10.1007/s12144-019-00344-4>.
67. Zhang J-J, Chen H. A cross-lag analysis between school adaptation difficulties and internet addiction of college freshmen. *Chin J Clin Psych*. 2022;29(005).
68. Zhang Y, Zhang D-J, Xiong L, Gu C-H. Effects of mobile phone addiction on depression and anxiety: mediation and moderation analyses. *Chin J Clin Psychol*. 2018;26(6):1086–90.
69. Zhao L. Social media addiction and its impact on college students’ academic performance: the mediating role of stress. *Asia Pac Educ Res*. 2023;32(1):81–90. <https://doi.org/10.1007/s40299-021-00635-0>.

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