

## Original Article

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# How social networking site addiction drives university students' academic achievement: The mediating role of learning engagement

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## Abstract

The main aim of this study was to explore the mediating role of learning engagement on the relationship between social networking site (SNS) addiction and academic achievement among 406 university students. The Social Networking Site Addiction Scale, Utrecht Work Engagement Scale for Students, and Chinese Students Academic Achievement Scale were used to evaluate students' SNS addiction, learning engagement, and academic achievement. Correlation analysis indicated that SNS addiction, learning engagement, and academic achievement were significantly correlated with each other. The causal steps regression and bootstrap analysis show that learning engagement mediated the relationship between SNS addiction and academic achievement. Implications for research and instructions for how to improve university students' academic achievement are discussed.

With the soaring development of technology, smartphones and the internet have brought much convenience to people nowadays, which gives people access to direct and abundant information. What attracts attention is that especially for the younger people, information is not equal to gains in knowledge. Knowledge refers to how by using a system or framework, an individual learns the facts, theories and application of a discipline over a long period of learning, summarizing, and thinking. However, these features of knowledge are not necessarily what we obtain from the daily use of smartphones and the internet. In short, to obtain information from a smartphone and the internet and to gain knowledge from systematic learning at school are two entirely different things that cannot be confused with each other. Does this mean that obtaining information from a smartphone and the internet is completely different from the daily study at school? Is there any connection, whether positive or negative, between them? This will be discussed in this article.

The smartphone and the internet have gradually changed the daily behavioral patterns of people. What is the presentation of this behavioral pattern change and what are people doing with smartphones and the internet? According to the *Report of the Social Network* released by the Survey and Data Center of Chinese Academy of Social Sciences (2017), young people are the major group in China who spend the most time on smartphones and the internet, through which they can access social networking sites (SNS). According to the data from the survey of young people (15–34 years old), 94% said they were not used to going out without a phone; 86.8% could not stand using a normal mobile phone instead of a smartphone; 84.4% would feel anxious if the phone could not connect to the internet (i.e. could only make phone calls or send text messages); 73% would check whether there were any new messages from social platforms such as WeChat/QQ at 15-minute intervals (similar to Facebook); 71.3% would scan WeChat/QQ when they were at a meeting; 85.8% would scan these social platforms before going to sleep; 78.8% would use them even at a party; 80.5% once tried not to search social platforms, but failed. It is not hard to conclude from the data above that a large number of young people who are addicted to their smartphones and the internet are overusing SNS. What negative effects will the addiction to SNS have on the young people? Here, we will make a deeper investigation about it.

## Social networking site addiction and academic achievement

The concept of SNS addiction comes from the concept of internet addiction (Andreassen, 2015). With the development of modern communication and media technology, the living standards of citizens have grown, giving rise to an increasing number of people who are using their mobile phone to connect to the internet. According to data from the Ministry of Industry and

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Information Technology of China, up to 2014, there were 1.146 billion users of the mobile telecommunication service in China, including 817 million users of mobile internet. According to the latest *Report of Internet Development* (China Institute of Information and Communication, 2017), the number of mobile internet users is larger than that of PC internet users. As a result, in recent years, SNS addiction has received more attention than traditional internet addiction. Internet addiction refers to psychosocial dysfunction when an individual appears to have an impulse control disorder from using the internet (Young, 1998). SNS addiction refers to the addiction behaviors of overusing SNS on smartphones (Turel & Serenko, 2012). According to the models of addiction, social internet addiction is classified as over-concern about SNS. Even if other social activities, study or work, interpersonal relationships, psychological health and sense of happiness may be impaired, the person has to access the SNS. He or she can feel a loss of control if their addiction to SNS does not consider the consequences (Andreassen, Torsheim, Brunborg, & Pallesen, 2012). SNS have four concrete features: (1) they are based on the internet; (2) they establish an open or semi-open archive in a system with boundary; (3) they connect with other users; (4) they have a deeper contact with and a better knowledge of other users (Boyd & Ellison, 2007). Logically, as SNS addiction is based on internet use, and internet addiction is considered to be an addictive behavior (A.M. Wu, Cheung, Ku, & Hung, 2013; C.W. Wang, Ho, Chan, & Tse, 2015), so too SNS addiction has the general character of addictive behaviors; that is, salience, mood modification, tolerance, withdrawal symptoms, conflict and relapse. Regarding salience, it can represent a total dedication in behavior, cognition and emotion to SNS; regarding mood modification, it can promote better emotional well-being when using SNS compared with not using them; regarding tolerance, it can represent an increased use of SNS; regarding withdrawal symptoms, it can elicit a bad mood or physical reaction when being limited or deprived of using SNS; regarding conflict, it can create problems for the individual and/or their interpersonal relationships; regarding relapse, it can represent as a repeated attack of addictive behaviors, or even a stronger addictive trend after withdrawal (Griffiths, 2012; Kuss & Griffiths, 2012).

Currently, some studies have revealed that SNS addiction can produce various negative effects on individuals. For example, Pontes' (2017) research indicated that SNS addiction has a negative effect on individual's psychological health. Mogbel and Kock (2017) also found that the individuals with higher levels of SNS addiction can have poor work-related consequences. SNS addiction has also been found to have negative impacts on individuals' emotions and self-esteem (P. Wang et al., 2018). So, can SNS addiction affect the academic achievements of students? Although there are not enough studies to answer this question, what is worth noting is that general internet addiction has been widely studied and proved to affect students' academic achievement (Eldeleklioglu & Vural-Batik, 2013; Haqbin, Shaterian, Hosseinzadeh, & Griffiths, 2013; Jang, 2012; Stavropoulos, Alexandraki, & Motti-Stefanidi, 2013). For instance, among college students in many countries (Akhter, 2013; Kumar et al., 2018; Usman, Alavi, & Shafeq, 2014) and high school students (Stavropoulos et al., 2013), internet addiction has been found to be one of the main causes of problems with individual academic achievement.

Therefore, in view of the similarity between SNS addiction and internet addiction, we put forward hypothesis 1 (H1): University students' SNS addiction can significantly predict their academic achievement.

### *Learning engagement and academic achievement*

The concept of learning engagement was proposed by Schaufeli, Martinez, Pinto, Salanova, and Bakker (2002), and it refers to a positive mental state concerning study behavior, with three aspects of vigor, dedication and absorption. Vigor refers to how an individual is willing to work hard and persist when faced with difficulty. Dedication refers to the strong sense of responsibility and accomplishment an individual has towards study; he or she has the ability to devote him/herself to study and is willing to take up challenges. Absorption means that individuals can focus and concentrate their energy on study for a long time and obtain a positive psychological experience during the process. The research concerned the connection between learning engagement and academic achievement of undergraduate students who were comparatively mature. Many studies have found proof of the significant effect of learning engagement on individual academic achievement (Bresó, Schaufeli, & Salanova, 2011; Furrer & Skinner, 2003; Johnson & Sinatra, 2010; Klem & Connell, 2004; Skinner, Kindermann, & Furrer, 2009). Jelas, Azman, Zulnaidi, and Ahmad's (2016) study found that learning engagement plays a mediating role between learning support and academic achievement among Malaysian students. Similarly, in other studies, learning engagement and classroom emotional climate (Northey, Govind, Bucic, Chylinski, Dolan, & Esch, 2017; Reyes, Brackett, Rivers, White, & Salovey, 2013), students' perception of learning environment (M.T. Wang & Holcombe, 2010), and classroom context (Dotterer & Lowe, 2011) were found to be key factors affecting students' academic achievement. Thus, based on the theory above, we put forward hypothesis 2 (H2): University students' learning engagement can significantly predict their academic achievement.

### *Social networking site addiction and learning engagement*

There is a lack of research about the relationship between SNS addiction and learning engagement of college students. According to the current studies, the negative influence that internet addiction has on individual's learning engagement is general and wide ranging (Lu & Hao, 2014; Salmela-Aro, 2016; Tsitsika et al., 2011; J.Y. Wu, 2016). For instance, in J. Wang's (2015) research, there were highly significant negative correlations between learning engagement and both learning weariness and internet addiction. Hence, J. Wang suggested that a better psychological environment will help to improve learning engagement, because with the development of internet technology the problem has become more severe. Further, not only has internet addiction been recognized as one of the reasons for the insufficient learning engagement of undergraduates, but some researchers have revealed that internet addiction can lead to learning burnout (Wei & Yang, 2007; B. Wang & Hai-Bin, 2007). Therefore, it has to some extent been proved that internet addiction has a connection with learning engagement. Because learning burnout is generally recognized as opposite to learning engagement, they are the two extremities of the individual learning state (Cazan, 2015; Salmelaaro, 2012). Learning burnout refers to a pressured, frustrated and disgusted psychological mental feeling an individual has because of the learning experience, which includes emotional exhaustion, negative learning attitude and behavior, and low sense of accomplishment. So, low individual learning exhaustion, in most circumstances, can be equally treated as high individual learning engagement; and vice versa. This also confirms the link between internet addiction and learning engagement.

In view of the above theoretical basis, we put forward hypothesis 3 (H3): University students' SNS addiction can significantly predict their learning engagement. As mentioned above, SNS addiction, learning engagement and academic achievement may have close connection with each other. Therefore, we speculate that there may be a common, interrelated and interacting mechanism between them. In real life, individuals' behavior or mental state is seldom affected by only one factor. So, the method of mediation test can help us understand the path and mechanism of interaction between multiple variables more clearly. Our research will investigate the relationship between SNS addiction, learning engagement, and academic achievement in Chinese university students, and we therefore put forward hypothesis 4 (H4): University students' learning engagement mediates the relationship between SNS addiction and academic achievement.

## Method

### Participants

Four hundred and fifty university students were recruited from five universities in Shaanxi, Guangxi, Guangdong and Inner Mongolia, China. Forty-four students had incomplete data or random responses and thus their records were discarded. The remaining sample consisted of 406 (effective rate = 90.2%); 235 were female (57.9%). Participants' ages ranged from 16 to 26 years, with an average age of 20.64 years ( $SD = 2.15$ ). There were 75 freshmen (18.5%), 116 sophomores (28.6%), 124 juniors (30.5%) and 91 seniors (22.4%). Participation was voluntary and anonymous. All procedures were executed in compliance with the relevant laws and institutional guidelines.

### Measures

#### Social networking site addiction

The Social Networking Site Addiction Scale (SNSAS) was used to evaluate social networking site addiction. The SNSAS was developed by Turel and Serenko (2012). It is a self-report scale with five questions: "I sometimes neglect important things because of my interest in this social networking website", "My social life has sometimes suffered because of me interacting with this social networking website", "Using this social networking website sometimes interfered with other activities", "When I am not using this social networking website, I often feel agitated", "I have made unsuccessful attempts to reduce the time I interact with this social networking website". All questions are scored on a 7-point Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*), and the total score of all items is calculated. A higher score indicates a higher level of SNS addiction. The SNSAS has been used in numerous studies (Andreassen & Pallesen, 2014; Kisyovska, 2015), and it has satisfactory reliability and validity.

#### Learning engagement

Learning engagement was assessed using the Utrecht Work Engagement Scale for Students (UWES-S), which was developed by Schaufeli et al. (2002). The Chinese version of the UWES-S was revised by Gan, Yang, Zhou, and Zhang (2007). The UWES-S is a self-report questionnaire comprised of 17 items, including three subscales: vigor (6 items), dedication (5 items), and absorption (6 items). Sample items include "When I get up in the morning, I will be happy to learn", "When I study, I feel that time passes quickly", "When I study, I only want to learn, and I will not distract myself from other things", "When I study, I can quickly

recover from mental fatigue". The response options are rated on a 7-point Likert-type scale ranging from 1 (*never*) to 7 (*every day*), with higher scores indicating higher levels of learning engagement. The Chinese version of the UWES-S has been used with Chinese students, and it has satisfactory reliability and validity (Gan et al., 2007; Zhang, Gan, & Cham, 2007).

#### Academic achievement

The Chinese Students Academic Achievement Scale (CSAAS; Wen & Cheng-Fu, 2010) was used to measure academic achievement. The CSAAS is a self-rating scale that consists of three items: English course, Professional course, and Political course (Ideological and Moral Recuperation, Fundamentals of Law, Outline of Modern Chinese History, Basic Principles of Marxism, Mao Zedong Thought and The System Info of Socialism with Chinese Characteristics, Contemporary World Economy and Politics, Situation and Policy). These three courses are the most important compulsory courses for all Chinese university students during their education. Participants answer on a 5-point Likert-type scale, ranging from 1 (*very bad*) to 5 (*very good*), according to their academic performance in each course. An average score of the three items is calculated, and a higher score indicates a higher level of academic achievement. The CSAAS has been widely applied among Chinese students with favorable reliability and validity (Ye, Hu, Yang, & Hu, 2014).

#### Statistical analysis

The measurement model test, correlations analyses, and mediation effect test were performed using Mplus7 and AMOSS 21.0. The missing values in the data are replaced by averages. The causal steps approach described by Baron and Kenny (1987) and bootstrap method (Preacher, Rucker, & Hayes, 2007) were used in this study to assess the proposed mediation models, as shown in Figure 1.

## Results

### Reliability and validity

In the current study, the Cronbach's alpha coefficients for the SNSAS, UWES-S, and CSAAS were .89, .85, and .77 respectively. The Guttman split-half coefficients for the SNSAS, UWES-S, and CSAAS were .74, .78, and .64 respectively. These results indicate that all of the measurement tools had satisfactory reliability. We also tested the convergent and discriminant validity of the measures. As shown in Figure 2, the standardized factor-loading coefficients of each observed variable are greater than .05, and all the average variance extracted (AVE) values of each latent variable are also greater than .05 (see Table 1), which suggests that all of the measures have satisfactory convergent validity. In addition, the square-root values of all AVE values of latent variables are higher than the corresponding correlation coefficients. This indicates that all the measures have favorable discriminant validity.

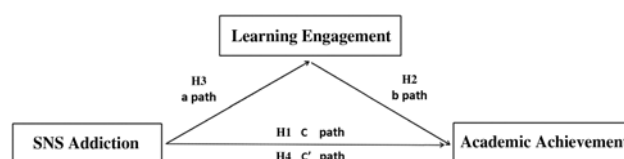
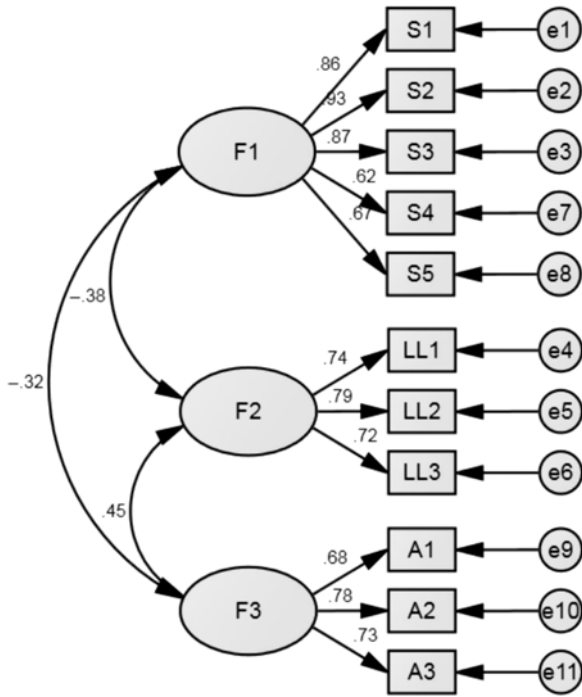


Figure 1. The theoretical model.



**Figure 2.** Factor load diagram in measurement model. F1 is SNS addiction, F2 is learning engagement, F3 is academic achievement, S1-S5 are 5 items of SNSAS, LL1-LL3 are 3 parcels of items of UWES-S, A1-A3 are 3 items of CSAAS.

**Correlation analyses**

The results of the correlation analyses between the investigated variables are presented in Table 1. As expected, there was a significant negative correlation between SNS addiction and academic achievement, and SNS addiction and learning engagement. There was a significant positive correlation between learning engagement and academic achievement. So, according to Baron and Kenny (1987), and MacKinnon (2002), the results of the correlation

**Table 1.** Correlations of all Variables

Variables	M	SD	AVE	$\sqrt{AVE}$	1	2	2.1	2.2	2.3	3
1 SNS addiction	14.07	5.82	.638	.799	-					
2 Learning engagement	65.93	11.34	.563	.751	-.315**	-				
2.1 Vigor	21.79	3.89	-	-	-.250**	.813**	-			
2.2 Dedication	18.83	4.26	-	-	-.324**	.841**	.576**	-		
2.3 Absorption	25.31	5.27	-	-	-.229**	.868**	.543**	.574**	-	
3 Academic achievement	3.19	.76	.535	.731	-.271**	.358**	.322**	.312**	.280**	-

Note: M = mean; SD = standard deviation; \*p < .05, \*\*p < .01, \*\*\*p < .001.

**Table 2.** Results of the Regression Analysis of c-path, a-path, c'-path and b-path

Dependent variable	Independent variable	Regression model	R <sup>2</sup>	B	SE	β	T
Academic achievement	SNS addiction	Y = cX + e1	.073	-.035	.006	-.271	-5.659**
Learning engagement	SNS addiction	M = aX + e2	.099	-.612	.092	-.315	-6.622**
Academic achievement	SNS addiction	Y = c'X + bM + e3	.156	-.022	.006	-.176	-3.644**
	Learning engagement			.020	.003	.303	6.285**

Note: B = regression coefficients, SE = standard error.

**Table 3.** Results of the Mediation Test (Bootstrap Analysis for Learning Engagement of SNS Addiction on Academic Achievement)

Mediated Variable	95% LLCI	Estimated (Indirect effect)	95% ULCI	Percentage mediated
Learning engagement	-.017	-.012	-.008	34.98%

Note: LLCI = lower limit confidence intervals; ULCI = upper limit confidence intervals.

analyses among SNS addiction, learning engagement, and academic achievement meet the requirements to conduct the mediation effect test.

**Test of the mediation effect of learning engagement**

Step 1: SNS addiction-Academic achievement (c-path): The results shown that SNS addiction was significantly associated with academic achievement (support H1). The total effect (c) is -0.035. See Table 2.

Step 2: SNS addiction-Learning engagement (a-path): SNS addiction was significantly associated with learning engagement (supports H3).

Step 3. SNS addiction-Academic achievement (c'-path) + Learning engagement (b-path): Significant associations with learning engagement were found for academic achievement, while significant associations with SNS addiction were found for learning engagement and academic achievement (supports H2). So, the direct effect (c') is -0.022, and the indirect effect (a\*b) is 0.012. In addition, as shown in Table 3, the results of the bootstrap analysis (a bootstrap sample of 1000 was specified) do not include zero. Thus, H4 was supported because learning engagement mediated the relationship between SNS addiction and academic achievement. Meanwhile, because the coefficient c' is also significant in the present regression model, the mediation effect is a partial mediation effect (Preacher & Hayes, 2008). In the full mediation model, the direct effect of the independent variable is zero, and all the effects are indirect effects. In the partial mediation model, independent variables have both direct and indirect effects on dependent variables. The mediated proportions were

calculated as the mediation effect divided by the total effect  $([a*b]/c)$ ; MacKinnon, 2002).

## Discussion

The present study explored the mediating role of learning engagement on the relationship between SNS addiction and academic achievement in Chinese university students. The results show that there is a significant relationship among SNS addiction, learning engagement, and academic achievement. In accordance with our expectations, SNS addiction was found to be a predictive factor for university students' academic achievement. The results indicated that there was a significant negative correlation between SNS addiction and academic achievement. These findings are also consistent with previous studies, which suggested that internet addiction is an important predictor of academic achievement (Eldeleklioglu & Vural-Batik, 2013; Haghbin, Shaterian, Hosseinzadeh, & Griffiths, 2013; Jang, 2012; Stavropoulos et al., 2013). We believe that SNS addiction has become an important factor in endangering university academic achievement. As the results show, the higher the degree of SNS addiction, the lower the academic achievement of the individual. Of course, SNS addiction, as a new specific type of internet addiction, may have a similar mechanism to internet addiction in its impact on individual academic achievement. For example, in some studies, many negative impacts are listed, such as dropping out or losing learning interest in school, most non-school hours spent on the internet, not keeping up with assignments, missing classes, falling asleep in school, declining grades, failing a course, and dropping out of other social groups (clubs or sports). Research on the relationship between internet use and the ability to focus attention has showed that the amount of time spent using the internet by young people was significantly related to higher ratings of distractibility for academic tasks. Excessive internet use can also cause deficient self-regulation and poor performance at school (Jiang, 2014). In addition, Stavropoulos et al.'s (2013) explanation of the influence mechanism of internet addiction on individual academic achievement is as follows: shyness, depression, and low self-esteem due to internet abuse have been claimed as possible explanations of the association between internet addiction and lower academic achievement. In addition, the lack of sleep due to internet use patterns can provoke a lack of concentration and interest in education. This can form knowledge gaps and thus declines in academic achievement. In turn, such results may further strengthen the association of poor academic achievement with internet abuse. Students who perform poorly in school may invest in online activities in order to achieve a satisfying level of self-esteem. In summary, we believe that SNS addiction may affect individuals' academic achievement through the channels mentioned above, but another way that SNS addiction can influence individuals' academic achievement is by influencing their learning engagement.

We found that SNS addiction was significantly associated with students' learning engagement. This finding is also in accordance with previous studies that reported that internet addiction was significant negatively correlated with academic achievement (Lu & Hao, 2014; Salmela-Aro, 2016; Tsitsika et al., 2011; J.Y. Wu, 2016). SNS addiction can influence every aspect of learning engagement for college students. As for the impact of SNS addiction on vigor in learning engagement, it can cause psychological and social damage to the individual, because of decreasing interest in other things except for SNS. When the individual is engaged in

other activities, they tend to present as anergic, irritable, exhausted, and even grievous. If such addiction behaviors are not brought under control, it can severely influence the mental health of the individual, leading to depression, anxiety, and social phobia. As for the impact of SNS addiction on the dedication in learning engagement, abundant studies show that it can have diverse impacts on the mental state of individuals, of which half are not positive. For instance, research points out that from an aspect of demand theory, when an individual browses SNS, it motivates a more diverse and complicated demand of self-physics and psychiatry, such as the thought of trying the restaurant other people share, going to the place other people recommend, buying a cosmetic others recommend, and so on (Aram & Piraino, 1978). Once an individual begins to overly use SNS, it can definitely produce an explosive growth in the number, categories and gradations of an individual's aspirations and wants, but not all of these can be satisfied in real life. Therefore, when more of those aspirations and wants come to nothing, the individual may feel a stronger sense of pressure, which may produce a very negative mental state. This problem can be treated from an aspect of social comparison theory, in which researchers point out how the individuals involuntarily compare their lives with others when they check their SNS, and such comparisons can have an influence on their emotions, especially for those with lower self-esteem (Suis & Wheeler, 2010); for example, the sense of frustration when you are working overtime and other people are sharing a football game you had been looking forward to watching for a long time. Other research has analyzed the problem from an aspect of conformity theory, in which SNS addiction means the individual conforms more obviously in their life and work (Bernheim, 1994). In certain situations, the overly conforming behavior may make one lose him or herself: if a person's choice is dictated by other people's choices or attitudes, he/she may lose the ability of self-judgement, which can damage their sense of self-worth, as they may not know what they really need or what they should stand up for. When someone loses sight of their goals for life and study, they are living for others and not for themselves. So, whether from the aspect of emotion or sense of worth, SNS addiction can have a great impact on the dedication of learning engagement. Finally, as for the impact of SNS addiction on dedicated learning engagement, on one hand, the recognition processing resources of an individual are limited. When an individual devotes more recognition processing resources to SNS use, the resources that are available for other tasks are naturally less. However, the demand of learning for recognition processing resources is extremely high. So, an individual with SNS addiction would manifest as insufficient in recognition-processing resources, leading to the situation of impaired absorption and exhaustion. On the other hand, the behavioral model of the individual is imperceptibly changing as the SNS habit is reinforced over a long period of time. When an individual develops SNS addiction, there can be a marked drop in self-control. A long-time and frequent use of SNS can break a normal daily study order in a routine learning process, leading to a marked drop in learning absorption and efficiency of the individual. As a result, no matter from any aspect, SNS addiction can have great damage on the individual learning engagement, and it is a growing trend.

In addition, our research found that there was a mediation effect of learning engagement in the relationship between SNS addiction and academic achievement. SNS addiction not only has a direct influence on academic achievement, but also an obvious impact on learning engagement. Learning engagement is a significant way of affecting academic achievement. So, as for the direct

impact of SNS addiction on academic achievement, or the indirect influence of learning engagement by SNS addiction, the negative effects and mechanisms produced by SNS addiction on academic achievement of college students are quite apparent. To resolve the situation of undergraduate SNS addiction, it may be possible to provide a way for college or undergraduates to improve their academic achievement. With respect to the researches of individual addiction behavior, an intervention that is generally accepted by experts and that has an effect in real life includes recognition-behavior treatment (Beck, 2011). If parents and schools want to help young people overcome their SNS addiction, they must help them recognize their current situation of SNS overuse, and lead them to gradually recognize the influence that SNS addiction has on their learning engagement and academic achievement, and analyze the reasons and results of that influence. An impersonal and clear understanding of the degree of SNS addiction can lead the students to take corresponding actions to deal with the problem and change their current use of SNS. Systematic desensitization therapy and substitution therapy with behavior reinforcement as its core idea is another intervention for SNS (McGlynn, 2010). The core idea of systematic desensitization therapy is coordinated supervision by schools and parents of the daily SNS usage, and consulting with the individual to make a reasonable plan for reducing frequency of SNS use. Over consecutive days, the individual gradually decreases the frequency of SNS use, and finally their over-dependence on SNS. Similarly, the core idea of substitution therapy is to help the SNS-addicted individual to develop other habits, such as swimming, climbing and traveling, or help them to improve the social skills and encourage them to engage more in group activities so that their social life and spiritual feeling will be improved, and their over-dependence on SNS will be ameliorated (Eisenberg, Davis, & Ettner, 1997). In all, whether it is at the level of school or family or individual, an efficient way to solve the SNS over-use problem is of great significance to individual career development, national education development, national talent recruiting, and social economic development.

To sum up, the present study provides substantial insight into a complicated interplay between SNS addiction, learning engagement, and academic achievement in Chinese students. These findings highlight a previously unidentified mechanism explaining the mediator role of learning engagement in the relationship between SNS addiction and academic achievement. The employment of Chinese students provides evidence for external validity of SNS addiction as the predictor of academic achievement. In consideration of the probable mechanisms, it provides some discussion and guidance on how to implement psychological interventions aimed at enhancing university students' academic performance. However, an important limitation of the present study must be considered: as it was a cross-sectional design, longitudinal studies would provide additional insights into the relationships between SNS addiction, learning engagement, and academic achievement.

## Conclusion

The most salient finding of this study pertains to the integrated model in which learning engagement mediates the relationship between university students' SNS addiction and academic achievement. SNS addiction has an indirect impact on university student' academic achievement via learning engagement.

**Ethical approval.** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional

and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Conflict of interest.** None.

**Informed consent.** Informed consent was obtained from all individual participants included in the study.

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