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ORIGINAL RESEARCH

Relationship Between Self-Esteem and Problematic Social Media Use Amongst Chinese College Students: A Longitudinal Study

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Purpose: Numerous cross-sectional investigations have delved into the association between the self-esteem of college students and problematic social media use (PSMU). Nevertheless, the debated causal sequence between the two factors persists, and their unclear developmental connection over time prevails.

Methods: We used a questionnaire method to follow 321 students in Chinese college over a period of 18 months and three times, of which 137 are male and 184 are female, with an average age of 18.42 years (SD = 0.78) at time 1. Descriptive statistics were used to present the general characteristics of the study participants. Moreover, the latent growth model was used to explore the developmental trajectory of self-esteem and PSMU and to explore the interplay between the two factors from a developmental perspective. On this basis, a cross-lagged model was used to verify the causal relationship between self-esteem and PSMU.

Results: In China, (a) the self-esteem levels of college students continuously decline during their academic years, whilst PSMU levels steadily increase. (b) The self-esteem of Chinese college students significantly negatively predicts PSMU. (c) The initial level of self-esteem amongst Chinese college students can significantly negatively predict the initial level of PSMU. Additionally, the rate of decline in self-esteem amongst Chinese college students can negatively predict the rate of increase in PSMU.

Conclusion: Obtained results serve as a valuable resource for researchers and educators, enabling strategic intervention in addressing issues related to PSMU amongst college students from a developmental perspective.

Keywords: self-esteem, problematic social media use, latent growth model, cross-lagged model, longitudinal study

Introduction

Social media, along with the rapid development of Internet technology, has been integrated into people's daily life. By the end of 2021, there were approximately 3.09 billion social media users worldwide.¹ Social media has significantly enriched people's lives by providing a virtual platform for them to chat with peers who share common interests, play games and post short videos. For a group of college students receptive to new things, using social media for entertainment and leisure has become one of their most popular activities.²

The widespread popularity of social media has brought various benefits to college students, satisfying their communication needs and also enhancing individuals' self-esteem and well-being through positive feedback from social media.³ However, several college students have become addicted to and overly dependent on social media, leading to problematic social media use (PSMU).⁴ PSMU is a phenomenon in which individuals are driven by strong motivation to use and become addicted to social media,⁵ which have different negative effects on college students' lives and studies.^{6,7} For example, PSMU leads to alcohol use, depression, poor interpersonal relationships and poor academic performance amongst college students.^{8–11} These phenomena have attracted the attention of scholars, and research has increasingly attempted to explore and identify factors that can influence or reduce PSMU. Amongst these factors, self-esteem has been found to have a strong relationship with PSMU.¹² Self-esteem is an individual's judgement of self-worth, perception of self-competence and acceptance of the overall self.¹³ Moreover, self-esteem is the evaluative component of the selfconcept. Existing literature suggests a negative relationship between self-esteem and PSMU, indicating that college students with low self-esteem are highly likely to experience PSMU.^{14,15}

Although a correlation has been identified between self-esteem and PSMU, our understanding of the association between the two factors remains incomplete. Firstly, the lack of clarity in the causal sequence between self-esteem and PSMU endures owing to the absence of longitudinal studies. Current cross-sectional investigations into this subject have yielded diverse results on the anticipated direction of the aforementioned relationship.^{15–17} Ambiguity persists on whether self-esteem serves as a cause or a consequence of PSMU. Secondly, further empirical research must be conducted to elucidate the intricate interplay between the developmental trajectory of self-esteem and PSMU. Although self-esteem and PSMU have previously been considered stable traits,^{18,19} the former can be stable or fluid in nature; that is, it does not change over time for some people but can change over time and with daily events for others.^{20,21} Moreover, the manifestation of PSMU may undergo transformations with age. Consequently, there exists the potential for a dynamic interplay between the two variables as they evolve over time.

This investigation seeks to address these lacunae through the analysis of three longitudinal data sets gathered from Chinese college students. The establishment of a causal link between self-esteem and PSMU uses a cross-lagged model. Subsequently, a latent growth model is applied to scrutinise the developmental trajectory of self-esteem and PSMU, along with their reciprocal interaction, from a developmental standpoint. The results derived from the dual longitudinal inquiries provide a theoretical foundation for interventions targeting self-esteem and PSMU in the developmental context of college students.

Literature Review

Causal Relations Between Self-Esteem and Problematic Social Media Use

Although self-esteem and PSMU are found to be correlated, their causal relationship remains unclear. The first view suggests that self-esteem negatively predicts PSMU,^{14,15} whereas the second view suggests a reverse relationship.^{16,17}

The first view suggests that self-esteem negatively predicts PSMU. Uses and gratifications theory (UGT) suggests that individual motivation and intensity of media use vary owing to differences in individual social and psychological needs and characteristics.²² The UGT framework is often used to investigate the relationship amongst media use motivation, individual differences and technology use problems.²³ To explain different types of Internet use disorders, researchers have developed the interaction of person–affect–cognition–execution (I-PACE) model on the basis of UGT theory. I-PACE suggests that core characteristics of individuals play an important role in the development and maintenance of Internet use disorders, and that people with different personality structures develop different levels of such problems.²⁴ Self-esteem,¹³ as a recognition and acceptance of the self within certain social standards, can be used as a specific personality that generates varying PSMU. Individuals with low self-esteem tend to be prone to a lack of self-identity and belonging and have certain social barriers.^{25–28} Social media can provide them with channels to communicate freely, instantly and openly, satisfying their psychological needs for social interaction and identity. Consequently, individuals with low self-esteem and identity¹² and gradually become addicted to interpersonal interactions in the virtual world. Numerous studies have also found a moderate negative relationship between self-esteem and PSMU,²⁹ and that college students with low self-esteem are likely to experience PSMU.^{14,15}

The second view is that PSMU can negatively predict self-esteem. According to the self-concept fragmentation hypothesis, individuals in social media are likely to be influenced by the online environment to explore multiple facets of the self, resulting in the failure to integrate a self-identity and also undermining the stable self that people have developed.³⁰

Self-esteem is an important component in the self-concept. Individuals addicted to social media can inhibit self-evaluation and have a damaging effect on their self-esteem.³¹ Thus, PSMU directly and negatively affects self-esteem. Additionally, people tend to make two types of comparisons on social networking sites, namely, upward and downward, with the former causing people to feel inferior and to evaluate themselves negatively.³² Thus, PSMU can negatively affect people's self-esteem through the mediating effect of upward comparisons.¹⁷ In summary, PSMU negatively predicts self-esteem.

The pertinent literature predominantly relies on cross-sectional data, making it challenging to decisively establish the causal sequence between self-esteem and PSMU. To overcome this challenge, we utilise a cross-lagged model to delve deeper into the correlation between self-esteem and PSMU to discern their causal relationship more effectively.

Developmental Relation of Self-esteem and PSMU over Time

The aforementioned studies have helped to reveal the causal sequence between self-esteem and PSMU, but the two factors are relatively static amongst the college student populations.^{21,33} Thus, how self-esteem interacts with PSMU over time must be examined.

College students are currently in the adolescent phase of their life progression, and they show certain developmental changes in self-esteem and PSMU. Firstly, self-esteem trends during adolescence vary across countries because people grow older across these countries. A study with a sample of European-Americans found a decreasing trend in adolescents' self-esteem over time in all schools during the middle school years.³³ Another study in the US with a sample of 7th graders, followed up to 10th grade, similarly found that adolescents' self-esteem tend to decline over time.³⁴ However, a Swiss longitudinal study of the youth also found that self-esteem tends to increase during adolescence and gradually continues into early adulthood.³⁵ A similar longitudinal study with a German sample indicated that selfesteem levels increase over time for individuals in adolescence and early adulthood.³⁶ In a sample of Chinese adolescents, self-esteem decline significantly beginning in the second year of middle school.³⁷ To provide more evidence to describe the developmental pathways of Chinese college students, we need more longitudinal studies in the Chinese context. Meanwhile, most of the available studies have supported an increasing trend of PSMU amongst adolescents over time. A two-year longitudinal follow-up survey with a sample of 397 female secondary school students in Estonia shows a linear increase in their PSMU over time.²¹ US-born youth aged 17-19 years show that their use of social networking sites to connect with others remained relatively stable over three years of follow-up study. However, the use of social networking sites from late adolescence to early adulthood also increases over time to find information and to alleviate boredom.³⁸ Meanwhile, 1419 Dutch middle school students in 2015–2019 show a trend of increasing and then decreasing levels of PSMU over time.³⁹ Most of the aforementioned studies have focused on adolescents at the secondary school level, and research on PSMU at the university level has remained scarce. Therefore, we use a longitudinal study of Chinese college students to provide additional evidence to accurately describe their developmental trajectory of PSMU.

In summary, earlier research has individually outlined the developmental path of self-esteem or PSMU, disregarding the exploration of their temporal relationship over time. This absence of a dynamic temporal developmental perspective has hindered the examination of the influential connection between the two factors. Therefore, a systematic examination must be conducted on the effect of the initial level of the independent variable on the dependent variable using a longitudinal tracing approach and the effect of the developmental trend of the independent variable on the dependent variable. In this investigation, a latent growth model is used to examine the dynamic developmental patterns of self-esteem and PSMU and to explore the mechanisms influencing them.

Present Study

The present study is deficient in utilising longitudinal data to demonstrate a causal relationship between self-esteem and PSMU. The developmental trajectories of self-esteem and PSMU and the potential dynamic influences between them are not addressed in the current study. Thus, this research centres on two primary research questions: (a) What is the causal sequence of the relationship between self-esteem and PSMU over time? (b) What are the trajectories of self-esteem and PSMU over time, and how do they exert mutual influence? This study builds upon this foundation and initially unveils the causal relationship between self-esteem and PSMU using a cross-lagged approach. Subsequently, a latent growth model is utilised to explain the developmental trajectory of self-esteem and PSMU amongst Chinese college students and the dynamic mechanism of their mutual influence. Using this study helps to theoretically determine their causal relationship and explain the changes and effects of self-esteem and PSMU over time. Lastly, this study helps to intervene in Chinese college students' PSMU from a practical perspective.

Participants and Procedures

By using a whole-group sampling method, we selected six freshman classes of 2021 from six universities in Fujian Province, China, with a total of 560 college students. The first measurement was carried out in October 2021, when the subjects were in their first year of college, and 560 questionnaires were distributed. The second measurement was conducted in April 2022 for the same sample, and 401 questionnaires were distributed (159 subjects were lost owing to personal reasons). The third measurement was performed in October 2022, with 350 questionnaires distributed (51 of the subjects were lost owing to suspension and withdrawal). The students' school ID number information was used for matching. By excluding data caused by misfiled school ID numbers and personal reasons for refusing to fill in their real school ID numbers, 321 valid paired questionnaires were eventually matched for the pre- and post-measurements. Amongst the participants, 137 are male and 184 are female; 158 are urban residents and 163 are from rural areas. On average, the age of participants was 18.42 years (SD = 0.78) at time 1. The survey was carried out with the informed consent of the subjects and approved by the Ethics Committee of Xiamen University (No. 115/2021).

Measures

Self-Esteem Measures

This measure, developed by Rosenberg¹² and translated into Chinese by Wang et al ⁴⁰ has been widely used in China as a unidimensional scale.⁴¹ The scale contains 10 questions, scored on a scale of 1 (very unconforming) to 5 (very conforming) points, with 5 reverse questions. A high total score indicates a high level of individual self-esteem. In this study, the Cronbach's alpha coefficients for the questionnaire measured at time points T1, T2 and T3 were 0.70, 0.76 and 0.70, respectively.

PSMU Measures

This measure, which was adapted from the Compulsive Internet Use Scale (CIUS) by Franchina et al ⁴² has good reliability and validity in several empirical studies with a sample of Chinese university students.⁴³ The scale consists of seven questions, an example of which is "I find it difficult not to use social media". The scale is scored from 1 (strongly disagree) to 5 (strongly agree), all of which are positive statements. A high total score indicates a high level of PSMU. The Cronbach's alpha coefficients for the questionnaire measured at time points T1, T2 and T3 were 0.82, 0.85 and 0.85, respectively.

Data Analysis

Firstly, SPSS 26.0 and Mplus 8.3 were utilised for data processing. Descriptive statistics and Pearson correlations were used to assess the relationship between self-esteem and PSMU in the three data measurements.

Secondly, a cross-lagged model was used to explore the causal order between self-esteem and PSMU. Cross-lagged models can be used to explore causal relationships between variables. The basic idea is to measure at least two variables at different time points and then infer possible causal relationships by comparing their lagged effects. Following the recommendations of Hu and Bentler,⁴⁴ the fit indices and corresponding acceptable thresholds were used to assess the cross-lagged model, including χ^2 , df, CFI > 0.900, TLI > 0.900, RMSEA < 0.080 and SRMR < 0.08. Moreover, χ^2 is frequently omitted when evaluating model fit owing to its sensitivity to sample size.⁴⁵

Lastly, we used a latent growth model to explore the initial levels and trends of self-esteem and problematic social media. Latent growth models can capture latent variables that change over time, enabling researchers to analyse and comprehend the changing trends of variables over the long and short terms whilst accounting for individual differences. We constructed a latent growth model using parallel processes to investigate the associations between the intercepts and slopes of self-esteem and PSMU.⁴⁶ Figures 1 and 2 illustrate the proposed models, in which the paths from the intercept factors to the observed variables were restricted to 1. This result implies that the intercept values remained constant across three measurement occasions for each individual.⁴⁷ Additionally, the connections from slope factors to the observed variables were limited to 0, 1 and 2, suggesting that the second factor can be interpreted as a slope.⁴⁷



Figure 1 Cross-lagged model of Self-esteem and Problematic social media use. Notes: *p < 0.05, **p < 0.01, ***p < 0.001.

Abbreviations: SES, self-esteem; PSMU, problematic social media use; T1, T2, T3, Time I, Time 2, Time 3.



Figure 2 LGM with Unconditional Variables of Self-esteem and Problematic social media use. Abbreviations: LGM, latent growth model; I, intercept; S, slope; T1, T2, T3, Time 1, Time 2, Time 3.

Results

Descriptive Statistics and Correlations

Table 1 presents the mean, standard deviation and correlation coefficient matrix for self-esteem and PSMU amongst college students across the three measurement points. Self-esteem is significantly and negatively correlated with PSMU from T1 to T3 (r = -0.106-0.392, p < 0.05). Additionally, we find two positive correlations for self-esteem at each time point (r = 0.238-0.328, p < 0.01) and two positive correlations for PSMU (r = 0.152-0.285, p < 0.01). The findings indicate that the simultaneous correlations and stability of self-esteem and PSMU amongst higher education students are generally congruent and suitable for cross-lagged and latent growth model analyses.

Table 1 Means, Standard Deviations, and Correlations Among Main Measu
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Variable	M(SD)	I	2	3	4	5	6
I.TI SES	2.844(0.397)	1.000					
2.T2 SES	2.804(0.289)	0.328**	1.000				
3.T3 SES	2.772(0.322)	0.238**	0.455**	1.000			
4.TI PSMU	2.463(0.664)	-0.392**	-0.154**	-0.140*	1.000		
5.T2 PSMU	2.544(0.687)	-0.221**	-0.335**	-0.238**	0.237**	1.000	
6.T3 PSMU	2.592(0.686)	-0.106*	-0.212**	-0.321**	0.152**	0.285**	1.000

Notes: *p < 0.05, **p < 0.01.

Abbreviations: SES, Self-esteem; PSMU, Problematic social media use; T1, T2, T3, Time 1, Time 2, Time 3.

Causal Relationship of Self-Esteem and PSMU

To verify the causal order of the relationship between self-esteem and PSMU, we use a cross-lagged model, as shown in Figure 1, which has good fit index (CFI = 0.994, TLI = 0.980, SRMR = 0.023, RMSEA = 0.030). As shown in Figure 1, self-esteem and PSMU have strong stability from T1 to T3, with standardised autoregressive path coefficients of 0.316–0.423 (p < 0.001) and 0.177–0.241 (p < 0.01), respectively. In the cross-predictive path, T1 self-esteem significantly and negatively predicts T2 PSMU ($\beta = -0.151$, p < 0.01). Similarly, T2 self-esteem significantly and negatively predicts T3 PSMU ($\beta = -0.132$, p < 0.05). However, PSMU does not predict self-esteem at either T1–T2 or T2–T3 time points.

In summary, the results of the cross-lagged model analysis support the notion that self-esteem negatively predicts PSMU amongst college students. The results further suggest that self-esteem and PSMU are relatively stable outcomes.

Decrease of Self-Esteem Amongst College Students

To investigate the developmental trajectory of self-esteem amongst Chinese college students throughout their college years, we establish a linear unconditional latent growth model, as illustrated in Figure 2. The linear unconditional latent growth model of self-esteem has good fit indices (CFI= 1.000, TLI= 1.000, RMSEA= 0.001, SRMR= 0.012). In this model, the initial level of the intercept, representing self-esteem, was 2.848 (SE= 0.022, p<0.001), which significantly above 0. The slope indicates a linear decreasing trend over the three measurements (Slope = -0.017, SE = 0.006, p < 0.01). Additionally, the variance estimate of the intercept factor (σ^2 = 0.059, SE = 0.025, p < 0.05) is significant at the 0.05 level, indicating significant differences in the initial level of individual self-esteem. The variance estimate of the slope factor (σ^2 = 0.003, SE = 0.002, p>0.05) is not significant, indicating no significant inter-individual differences in the rate of decline of individual self-esteem over time.

Aggravation of PSMU Amongst College Students

To investigate the developmental trajectory of PSMU amongst Chinese college students throughout their college years, we construct a linear unconditional latent growth model, as depicted in Figure 2. The linear unconditional latent growth model for PSMU has good fit indices (CFI = 1.000, TLI = 1.000, RMSEA = 0.001, SRMR = 0.006). In this model, the initial level of the intercept, representing PSMU, was 2.462 (SE = 0.037, p < 0.001), significantly exceeding 0. The slope shows a linear increase in trend over the three measurements (Slope = 0.031, SE = 0.012, p < 0.01). Furthermore, the variance estimate of the intercept factor ($\sigma^2 = 0.223$, SE = 0.109, p < 0.05) is significant at the 0.05 level, indicating noteworthy individual variations in the initial level of individual PSMU. The variance estimate of the slope factor ($\sigma^2 = 0.015$, SE = 0.009, p > 0.05) is not significant, indicating no significant inter-individual differences in the rate of increase in the level of PSMU over time.

Development Relationship of Self-Esteem and PSMU

To explore the dynamic influencing processes between self-esteem and PSMU amongst Chinese college students, we construct a latent growth model with parallel processes to concurrently investigate the potential growth of self-esteem and PSMU. Firstly, we utilise the intercept and slope in the self-esteem model to forecast a linear increase in PSMU. The model demonstrated good fit with CFI = 0.981, TLI = 0.958, RMSEA = 0.048, SRMR = 0.044, making it suitable for the subsequent stage of analysis. In the latent growth model depicting the parallel development of self-esteem and PSMU, the regression results are illustrated in Figure 3. The intercept of self-esteem negatively predicts the intercept of PSMU, with $\beta = -0.711$, SE = 0.250, p < 0.01. That is, as the initial level of self-esteem of college students increase, their initial level of PSMU decreases. The slope of self-esteem had a negative impact on the slope of PSMU, with $\beta = -0.708$, SE = 0.551, p < 0.05. This result suggests that the more rapid the decline in self-esteem over time, the faster the increase in PSMU amongst college students.



Figure 3 LGM with parallel processes of Self-esteem and Problematic social media use. Notes: *p < 0.05, **p < 0.01, ***p < 0.01.

Abbreviations: LGM, latent growth model; I SES, intercept of self-esteem; S SES, slope of s self-esteem; I PSMU, intercept of problematic social media use; S PSMU, slope of problematic social media use; T I, T2, T3, Time I, Time 2, Time 3.

Discussion

This study answers two main questions: (a) What is the causal sequence between self-esteem and PSMU amongst Chinese college students? (b) What are the developmental trajectories of self-esteem and PSMU amongst Chinese college students and their dynamic influencing mechanisms? The preceding results provide evidence to answer the two questions. The findings firstly formalise that self-esteem is a stable predictor of PSMU and then confirm that the development of the former affects that of the latter over time.

Self-Esteem as a Predictor of Self-Esteem and PSMU

To answer the causal order between self-esteem and PSMU amongst Chinese college students, we use a cross-lagged model to measure their relationship in a three-wave survey. The findings show that self-esteem steadily and negatively predicts PSMU in the three-wave test but does not support the predictive effect of PSMU on self-esteem. This finding rejects the bivariate hypothesis of self-esteem and PSMU. Thus, self-esteem is shown to be a stable predictor variable of PSMU. Most previous studies on self-esteem and PSMU have only provided cross-sectional studies of relevant data. When cross-lagged models are used, the results explain the influence direction of both factors, which is self-esteem negatively influences PSMU. Overall, the results are consistent with those of previous partial cross-sectional studies, in which self-esteem negatively influences PSMU.^{14,15}

Why is self-esteem a stable predictor of PSMU? According to the social compensation hypothesis (SCP), people who do not feel secure in real-life interpersonal relationships may have a negative social identity, which can cause them to spend considerable time using social networks as compensation.⁴⁸ Individuals with low self-esteem are more prone to poor interpersonal development compared with those with high self-esteem⁴⁹ and need to compensate for their social relationships or other personal problems by using social networks.⁵⁰ Therefore, people with low self-esteem tend to use social media to compensate for real-life interpersonal interactions; such excessive practice leads to PSMU. Alternatively, this phenomenon can be explained by self-esteem theory, which suggests that individuals generally have a tendency to enhance their self-esteem and to increase, maintain or determine their personal satisfaction and sense of worth.⁵¹ In daily life, college students with low self-esteem need positive stimuli to increase their self-evaluation to determine their sense of worth. For this purpose, the stimuli of mere likes and comments on social media precisely meet their needs. These individuals feel the improvement of their self-worth through social media, thereby increasing the frequency of its unreasonable use. This finding suggests that the worsening PSMU must be stopped by increasing college students' self-esteem.

Development of Self-Esteem Affects That of PSMU Over Time

We construct an unconditional latent growth model to investigate the developmental trends of self-esteem and PSMU and an additional parallel developmental latent growth model to investigate their dynamic influences in development. Firstly, the results of the unconditional latent growth model show that Chinese college students' self-esteem levels gradually decrease over their college years. This finding is markedly consistent with the results of previous studies on self-esteem development trends⁵² and also fully considers the Chinese context. The reason for the inconsistency between the research results may lie in the different ages of the study participants. Previous studies that found an increase in self-esteem levels over time have been mainly conducted with secondary school students,^{35,36} whereas the present study surveys college students. Social identity theory suggests that people strive to pursue or maintain a positive social identity to enhance their self-esteem, and this positive social identity is derived from social comparison.⁵³ When individuals are confronted with upward comparative information, their positive selves are vulnerable to threats.⁵⁴ In China, students have a singular experience in secondary school, and most of them only need to consider how to improve their academic performance.⁵⁵ They face social comparison only through academic performance, whereas the lack of social comparison in university is very complex. University life is similar to a reduced version of social life where interpersonal states, family economic situation and academic achievements are compared. This fact has a negative effect on and may reduce self-esteem.⁵⁶ Additionally, after entering university for the first time, college students' self-orientation remains unclear. With large gaps between students' ideal and reality, they cannot adapt well in various aspects, which may easily lead to low self-esteem.⁵⁷

The results of an unconditional latent growth model of PSMU show that Chinese college students, this concern gradually increases over time. This finding is consistent with those of previous studies.^{21,38} On the one hand, universities are currently undergoing digital reform and transformation with the development of digital technology, and activities related to the learning and development of university students are carried out online and even on social media; over time, this situation creates a type of dependence and causes difficulties for university students to eliminate its use.⁵⁸ On the other hand, PSMU is actually a behavioural addiction characterised by the difficulty of resisting engaging in a behaviour for a long time.⁵⁹ If not controlled, then PSMU may increase in severity.

Lastly, the results of the latent growth model for the parallel development of self-esteem and PSMU indicate that the initial level of self-esteem negatively influences that of PSMU. That is, individuals with high levels of self-esteem had low levels of PSMU. This finding is consistent with those of previous studies that college students with low self-esteem are prone to poor interpersonal development⁴⁹ and need to compensate for their social relationships or other personal problems through frequent use of social networks.⁵⁰ Moreover, college students with low self-esteem need positive stimuli in social media to improve their self-evaluation and, thus, determine their sense of worth, which increases the irrational use of social media. Additionally, this study shows that the slope of self-esteem negatively predicts that of PSMU. That is, the faster the rate of decline in self-esteem, the faster the rate of increase in PSMU. Although previous studies have examined the relationship between self-esteem and PSMU from a static perspective, the present study is the first to demonstrate the negative predictive effect of self-esteem on PSMU from the static and dynamic perspectives. The possible reason for this result is that college students with high self-esteem also have high self-efficacy and task-oriented motivation;^{60,61} when their self-esteem levels increase, they are more inclined to develop positive task strategies and less likely to indulge in social media. This reason also suggests that self-esteem is a protective factor for rational social media use behaviour and that increasing the level of self-esteem is effective in reducing PSMU. By contrast, college students with low self-esteem fit the hypothesis of the problem behaviour model,⁶² in which adolescents with low self-esteem exhibit multiple maladaptive behaviours, such as PSMU. Moreover, the faster the level of self-esteem decreases, the faster the emergence of maladaptive behaviours.

On the bases of the preceding empirical results, Chinese universities should implement the following policy measures to address the issues of decreased self-esteem and PSMU amongst college students. (a) Provide Mental Health Support: Offer comprehensive mental health support and counseling services to assist students in dealing with self-esteem issues and stress caused by social media use. Establish mental health advocacy programs and encourage students to seek support actively. (b) Strengthen Education and Training: Enhance education on self-esteem and healthy social media use at the university level. Introduce relevant courses to help students understand their self-worth, cultivate positive self-esteem and provide guidance for a considerably healthy use of social media. (c) Enhance Family and Community Collaboration: Promote collaboration amongst schools, families and communities to collectively focus on students' mental health. Establish communication mechanisms between schools and families to provide a supportive social environment to help shape positive self-esteem and social media habits amongst students. (d) Strengthen Oversight

and Guidance: Implement relevant policies and guidelines to regulate social media use within schools and provide guidance to students, ensuring their positive and healthy behaviour in the virtual space.

Limitations and Directions

Although this study obtained important findings on the static and dynamic effects of the relationship between self-esteem and PSMU, several limitations remain. Firstly, this study's sample is drawn from only six Chinese universities, thereby possibly underrepresenting over 3000 universities in China. This situation may result in some regression paths being significant within specific subgroups in different regions. Accordingly, future studies must enrich the heterogeneity of the sample and expand the scope of application of the findings. Secondly, this study only examines the influence of individual factors on PSMU, lacking the controlling role of contextual factors. This situation may lead to the current results being influenced by some other variables, introducing a certain degree of bias. This role may be added in future studies. Lastly, data amassed in this research heavily rely on self-reported information from college students, serving as the only indirect cues for evaluating their psychological and behavioural performance. This factor may introduce a certain degree of social desirability bias to the results. Hence, interpretation of these findings must be approached with due caution. Future studies could enhance the robustness of the analysis by incorporating additional data sources, such as student interviews, faculty reports, paper-and-pencil assessments and observations, to complement the selfreported data.

Conclusion

This study uses cross-lagged regression analysis with latent growth models to explore the causal sequence of self-esteem and PSMU amongst Chinese college students and their developmental trajectories and dynamic influencing mechanisms. The findings suggest the following conclusions. (a) Chinese college students' self-esteem significantly and negatively predicts PSMU. (b) Chinese college students' self-esteem levels continue to decrease and PSMU levels continue to increase. (c) Lastly, the initial level and rate of decline of Chinese college students' self-esteem can significantly and negatively influence the initial level and rate of increase of PSMU. The results provide theoretical support for researchers and educators to prevent PSMU amongst college students and suggest interventions to reduce such issues from the developmental perspective of their self-esteem.

Ethics Approval

The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Ethics Committee of Xiamen University. Informed consent was obtained from all participants involved in the study.

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References

- 1. Statista I. Number of social media users worldwide from 2010 to 2021 (in billions). Statista. 2018;2018:1.
- 2. Ahn J. The effect of social network sites on adolescents' social and academic development. Curr Theor Contro J America Soc Inform Sci Tech. 2011;62(8):1435–1445. doi:10.1002/asi.21540
- 3. Rajamohan S, Bennett E, Tedone D. The hazards and benefits of social media use in adolescents. *Nursing*. 2019;49(11):52–56. doi:10.1097/01. NURSE.0000585908.13109.24

- Hong FY, Huang DH, Lin HY, Chiu SL. Analysis of the psychological traits, Facebook usage, and Facebook addiction model of Taiwanese university students. *Telematic Inform*. 2014;31(4):597–606. doi:10.1016/j.tele.2014.01.001
- 5. Schou Andreassen C, Pallesen S. Social network site addiction-an overview. Curr Pharm Des. 2014;20(25):4053-4061. doi:10.2174/ 13816128113199990616
- 6. Ryan T, Chester A, Reece J, Xenos S. The uses and abuses of Facebook: a review of Facebook addiction. J Behav Addict. 2014;3(3):133–148. doi:10.1556/jba.3.2014.016
- 7. Griffiths MD, Kuss DJ, Demetrovics Z. Social Networking Addiction: An Overview of Preliminary Findings. *Behavioral Addictions*. 2014;2014:119–141. doi:10.1016/B978-0-12-407724-9.00006-9
- Hormes JM. Under the influence of Facebook? Excess use of social networking sites and drinking motives, consequences, and attitudes in college students. J Behav Addict. 2016;5(1):122–129. doi:10.1556/2006.5.2016.007
- 9. Steers MLN, Wickham RE, Acitelli LK. Seeing everyone else's highlight reels: how Facebook usage is linked to depressive symptoms. J Soc Clinical Psy. 2014;33(8):701–731. doi:10.1521/jscp.2014.33.8.701
- 10. Lee ZW, Cheung CM, Thadani DR An investigation into the problematic use of Facebook. Hawaii Int Confer System Sci, IEEE. 2012;2012:1768–1776.
- 11. Maremmani AG, Cerniglia L, Cimino S, et al. Further evidence of a specific psychopathology of addiction. differentiation from other psychiatric psychopathological dimensions (such as obesity). *Int J Environ Res Public Health*. 2017;14(8):943. doi:10.3390/ijerph14080943
- 12. Malik S, Khan M. Impact of Facebook addiction on narcissistic behavior and self-esteem among students. J Pak Med Assoc. 2015;65(3):260-263.
- 13. Rosenberg M. Society and the Adolescent Self-Image. Princeton: NJ: Princeton University Press; 1965.
- 14. Cingel DP, Carter MC, Krause HV. Social media and self-Esteem. Current Opinion in Psychology. 2022:101304. doi:10.1016/j.copsyc.2022.101304
- 15. Mehdizadeh S. Self-presentation 2.0: narcissism and self-esteem on Facebookg. *Cyberpsy Behav Social Network*. 2010;13(4):357–364. doi:10.1089/cyber.2009.0257
- Chen W, Lee KH. Sharing, liking, commenting, and distressed? The pathway between Facebook interaction and psychological distress. *Cyberpsychol Behav Social Networking*. 2013;16(10):728–734. doi:10.1089/cyber.2012.0272
- 17. Vogel EA, Rose JP, Roberts LR, Eckles K. Social comparison, social media, and self-esteem. *Psy Popular Media Culture*. 2014;3(4):206–222. doi:10.1037/ppm0000047
- Wagner J, Lüdtke O, Trautwein U. Self-esteem is mostly stable across young adulthood: evidence from latent STARTS models. J Person. 2016;84 (4):523–535. doi:10.1111/jopy.12178
- Coyne SM, Padilla-Walker LM, Holmgren HG, Stockdale LA. Instagrowth: a longitudinal growth mixture model of social media time use across adolescence. J Res Adol. 2019;29(4):897–907. doi:10.1111/jora.12424
- 20. Heartherton TF, Polivy J. Development and validation of a scale for measuring self-esteem. J Person and Soc Psy. 1991;60(6):895-910. doi:10.1037/0022-3514.60.6.895
- Raudsepp L, Kais K. Longitudinal associations between problematic social media use and depressive symptoms in adolescent girls. *Preventive Med Report*. 2019;15:100925. doi:10.1016/j.pmedr.2019.100925
- 22. Rubin AM. Audience activity and media use. Comm Monographs. 1993;60(1):98-105. doi:10.1080/03637759309376300
- 23. Floros G, Siomos K. The relationship between optimal parenting, Internet addiction and motives for social networking in adolescence. *Psych Res.* 2013;209(3):529–534. doi:10.1016/j.psychres.2013.01.010
- Brand M, Young KS, Laier C, Wölfling K, Potenza MN. 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;71:252–266. doi:10.1016/j.neubiorev.2016.08.033
- 25. Duclona O. Social Skills Development, Degree Commitment, and Self-Esteem as Predictors of Self-Identity. Doctoral dissertation, Capella University; 2022.
- 26. Abdel-Khalek AM. Introduction to the psychology of self-esteem. Self-Esteem. 2016;2016:1-23.
- 27. Hernández MM, Robins RW, Widaman KF, Conger RD. Ethnic pride, self-esteem, and school belonging: a reciprocal analysis over time. *Develop Psychol.* 2017;53(12):2384. doi:10.1037/dev0000434
- 28. Strudwicke L. Sense of belonging and self-esteem: what are the implications for educational outcomes of secondary school students?: a Literature review; 2000.
- 29. Köse ÖB, Doğan A. The relationship between social media addiction and self-esteem among Turkish university students. *Addicta*. 2019;6 (1):175–190. doi:10.15805/addicta.2019.6.1.0036
- Valkenburg PM, Peter J. Online communication among adolescents: an integrated model of its attraction, opportunities, and risks. J Adolesc Health. 2011;48(2):121–127. doi:10.1016/j.jadohealth.2010.08
- Andreassen CS, Pallesen S, Griffiths MD. The relationship between addictive use of social media, narcissism, and self-esteem: findings from a large national survey. Addict Behav. 2017;64:287–293. doi:10.1016/j.addbeh.2016.03.006
- 32. Morse S, Gergen KJ. Social comparison, self-consistency, and the concept of self. J Person Soc Psyc. 1970;16(1):148. doi:10.1037/h0029862
- Scheier LM, Botvin GJ, Griffin KW, Diaz T. Dynamic growth models of self-esteem and adolescent alcohol use. J Early Adol. 2000;20(2):178–209. doi:10.1177/0272431600020002004
- 34. Reddy R, Rhodes JE, Mulhall P. The influence of teacher support on student adjustment in the middle school years: a latent growth curve study. Develop Psyc. 2003;15(1):119–138. doi:10.1017/S0954579403000075
- 35. Erol RY, Orth U. Self-esteem development from age 14 to 30 years: a longitudinal study. J Person Soc Psyc. 2011;101(3):607-619. doi:10.1037/ a0024299
- 36. Orth U, Maes J, Schmitt M. Self-esteem development across the life span: a longitudinal study with a large sample from Germany. *Develop Psychol.* 2015;51(2):248–259. doi:10.1037/a0038481
- 37. Zhang WX. The self-esteem of junior high school students. Psychol Sci. 1997;20(6):504-508. doi:10.16719/j.cnki.1671-6981.1997.06.006
- 38. Stockdale LA, Coyne SM. Bored and online: reasons for using social media, problematic social networking site use, and behavioral outcomes across the transition from adolescence to emerging adulthood. *J adol.* 2020;79(1):173–183. doi:10.1016/j.adolescence.2020.01.010
- Boer M, Stevens GW, Finkenauer C, Van den Eijnden RJ. The course of problematic social media use in young adolescents: a latent class growth analysis. *Child Develop.* 2022;93(2):e168–e187. doi:10.1111/cdev.13712

- 40. Wang XD, Wang X, Ma H. Handbook of Mental Health Rating Scales. In: *China Journal of Mental Health*. Beijing, CHINA: Humana Press; 1999. Chinese.
- Han XQ, Jiang B, Tang JY, Wang YR. Problems and suggestions in the use of self-esteem scales. *Chin J Behav Med Brain Sci.* 2005;14(8):763. doi:10.3760/cma.j.issn.1674-6554.2005.08.054
- 42. Franchina V, Vanden Abeele M, Van Rooij AJ, Lo Coco G, De Marez L. Fear of missing out as a predictor of problematic social media use and phubbing behavior among Flemish. Adoles Inter j Envir Res Public Health. 2018;15(10):2319. doi:10.3390/ijerph15102319
- 43. Chen Y, Liu X, Chiu DT, et al. Problematic social media use and depressive outcomes among college students in China: observational and experimental findings. Int J Environ Res Public Health. 2022;19(9):4937. doi:10.3390/ijerph19094937
- 44. Hu LT, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. Struct Equ Modeling. 1999;6(1):1–55. doi:10.1080/10705519909540118
- 45. Kline RB. Principles and Practice of Structural Equation Modeling. London, UK: Guilford publications; 2015.
- Muthén LK, Muthén B. Growth Modeling with Latent Variables Using Mplus: Introductory and Intermediate Growth Models. Mplus. Short Course Topic, 3; 2010.
- 47. Byrne BM. Structural equation modeling with Mplus: basic concepts, applications, and programming. Routledge. 2013. doi:10.4324/9780203807644
- 48. Ruppel EK, McKinley CJ. Social support and social anxiety in use and perceptions of online mental health resources: exploring social compensation and enhancement. *Cyberpsy Behav Soc Network*. 2015;18(8):462–467. doi:10.1089/cyber.2014.0652
- 49. Dumitriu C, Tobolcea I, Dumitriu G. The effect of self-esteem on the development of interpersonal relationships. *Lucrari stiintific agro.* 2010;53 (1):211–214.
- 50. Kircaburun K, Demetrovics Z, Şb T. Analyzing the links between problematic social media use, dark triad traits, and self-esteem. Int J Ment Health Addict. 2019;17(6):1496–1507. doi:10.1007/s11469-018-9900-1
- 51. Jones SC. Self-and interpersonal evaluations: esteem theories versus consistency theories. *Psychol Bull.* 1973;79(3):185–199. doi:10.1037/h0033957
- 52. Robins RW, Trzesniewski KH, Tracy JL, Gosling SD, Potter J. Global self-esteem across the life span. *Psychol Aging*. 2002;17(3):423–434. doi:10.1037/0882-7974.17.3.423
- Negy C, Shreve TL, Jensen BJ, Uddin N. Ethnic identity, self-esteem, and ethnocentrism: a study of social identity versus multicultural theory of development. *Cultural Diversity Ethnic Minority Psychol.* 2003;9(4):333–344. doi:10.1037/1099-9809.9.4.333
- 54. Collins RL. For better or worse: the impact of upward social comparison on self-evaluations. *Psychol Bull.* 1996;119(1):51. doi:10.1037/0033-2909.119.1.51
- 55. Kirkpatrick R, Zang Y. The negative influences of exam-oriented education on Chinese high school students: backwash from classroom to child. *Language Test Asia*. 2011;1(3):36. doi:10.1186/2229-0443-4-2
- 56. Jiang S, Ngien A. The effects of Instagram use, social comparison, and self-esteem on social anxiety: a survey study in Singapore. Social Med Soc. 2020;6(2):2056305120912488. doi:10.1177/2056305120912488
- 57. Chen C, Shen Y, Zhu Y, Xiao F, Zhang J, Ni J. The effect of academic adaptability on learning burnout among college students: the mediating effect of self-esteem and the moderating effect of self-efficacy. *Psy Res Behav Manage*. 2023;16:1615–1629. doi:10.2147/PRBM.S408591
- 58. Li L, Niu Z, Mei S, Griffiths MD. A network analysis approach to the relationship between fear of missing out (FoMO), smartphone addiction, and social networking site use among a sample of Chinese university students. *Computer Human Behav.* 2022;128:107086. doi:10.1016/j. chb.2021.107086
- 59. Kardefelt-Winther D, Heeren A, Schimmenti A, et al. How can we conceptualize behavioural addiction without pathologizing common behaviours? *Addiction*. 2017;112(10):1709–1715. doi:10.1111/add.13763
- Thijs J, Verkuyten M. Peer victimization and academic achievement in a multiethnic sample: the role of perceived academic self-efficacyy. J edu psycholog. 2008;100(4):754–764. doi:10.1037/a00
- 61. Skaalvik EM. Self-enhancing and self-defeating ego orientation: relations with task and avoidance orientation, achievement, self-perceptions, and anxiety. *J Educ Psychol.* 1997;89(1):71–81. doi:10.1037/0022-0663.89.1.71
- 62. Jessor R, Jessor SL. Problem Behavior and Psychosocial Development: A Longitudinal Study of Youth. New York, NY: Academic Press; 2014.

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