

BMJ Open Association between problematic social media use and psychological distress among college students: a cross-sectional study in China exploring the mediating role of eating disorders

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ABSTRACT

Objectives This study aimed to examine the mediating role of eating disorders in the association between problematic social media use (PSMU) and psychological distress, including anxiety, depression and stress, among Chinese college students. The primary hypothesis was that eating disorders would partially mediate the relationship between PSMU and psychological distress.

Design A cross-sectional study.

Setting Participants were recruited from a vocational college in Jiangxi, China.

Participants A total of 454 college students aged 18 years or older participated in the study. The median age was 19 years (IQR=18, 20), and 73.4% were male. Participants were included if they were enrolled in college and able to provide informed consent. Students undergoing psychological treatment or taking psychiatric medications were excluded.

Primary outcome measures PSMU was assessed using the Bergen Social Media Addiction Scale, psychological distress was assessed using the Depression Anxiety Stress Scales-21 and eating disorder symptoms were assessed using the SCOFF questionnaire.

Results PSMU was significantly associated with higher levels of psychological distress ($r=0.321$, $p<0.05$) and eating disorders ($r=0.298$, $p<0.05$). The mediation analysis showed that eating disorders accounted for 39.8% of the total effect of PSMU on psychological distress. The indirect effect of PSMU on psychological distress through eating disorders was statistically significant ($B=0.119$, $SE=0.018$, $p<0.001$).

Conclusions Eating disorders play a partial mediating role in the relationship between PSMU and psychological distress among Chinese college students. These findings highlight the need for mental health interventions addressing both PSMU and eating disorders. Future research should use longitudinal designs to establish causal relationships.

Trial registration number ChiCTR2300078008.

INTRODUCTION

With the rapid development of technology, social media has become an indispensable part of modern life, especially among college

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ Constructed and analysed a mediation model to examine the mediating role of eating disorders in the relationship between problematic social media use (PSMU) and psychological distress, providing new insights into the complex interactions between these variables.
- ⇒ The cross-sectional design limits the ability to infer causal relationships between PSMU, eating disorders and psychological distress.
- ⇒ Reliance on self-reported data may introduce biases, such as social desirability bias or inaccurate self-assessment, which could affect the validity of the results.

students. The China Internet Network Information Center reported that by 2024, the number of internet users in China had reached 11 billion, with approximately 13.5% aged between 20 and 29, many of whom are university students. However, the issue of problematic internet use (PIU) is becoming increasingly prominent, encompassing various forms such as gaming disorder, problematic social media use (PSMU) and problematic smartphone use. Epidemiological data indicate that the prevalence of PIU increased during the COVID-19 pandemic.¹ Studies have shown a rise in emergency room visits for eating disorders worldwide during the pandemic,² likely linked to increased social media use, which intensified body image concerns and social comparison as people turned to digital platforms for coping during lockdowns.³ PSMU, a specific form of PIU characterised by excessive or inappropriate engagement with social media, has been associated with psychological and physiological health issues, including depression and eating disorders, through mechanisms such as social comparison, body dissatisfaction, low

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self-esteem, and psychological distress. Vannucci noted that frequent use of social media is associated with health issues such as sleep disturbances, anxiety, depression and eating disorders.⁴

Further research indicates a significant association between PSMU and psychological distress. Meta-analytic evidence shows that PSMU is significantly associated with psychological distress in different populations, such as individuals with attention deficit hyperactivity disorder, schizophrenia, teachers and schoolchildren.¹ For example, research has found that PSMU is positively correlated with depressive symptoms among young adults, particularly when it interferes with daily activities and sleep patterns.⁵ Similarly, excessive social media use has been linked to higher levels of loneliness and social anxiety, contributing to psychological distress.⁶ These findings suggest that PSMU contributes to psychological distress through mechanisms such as social comparison, low self-esteem and disrupted daily routines.

Eating disorders, including anorexia nervosa, bulimia nervosa and binge eating disorder, are significant health concerns among adolescents and young adults. Globally, the prevalence of eating disorders among college students ranges from 10% to 20%, with higher rates observed in females than males.⁷ In East Asia, cultural beauty standards emphasising thinness and societal pressures have been identified as major contributors to disordered eating behaviours.⁸ Research among Taiwanese university students has shown that weight stigma significantly influences disordered eating behaviours through psychological distress.⁹

Recent studies have increasingly focused on the link between PSMU and eating disorders. For instance, greater engagement with social media platforms is associated with a higher risk of developing eating disorders in young adults.¹⁰ Additionally, social media platforms often promote unrealistic body ideals, which can exacerbate body dissatisfaction and increase the likelihood of eating disorders.¹¹ Exposure to social media content related to dieting, exercise and body image is strongly correlated with disordered eating behaviours among adolescents and young adults.¹² Additionally, PSMU has been connected to an increase in internalised weight bias, which refers to the internalisation of negative societal attitudes about one's weight, leading individuals to apply these judgments to themselves. This bias has been identified as a key predictor of eating disorder symptoms.¹³

Eating disorders are not only linked to physical health issues but also strongly associated with psychological conditions, such as stress, anxiety and depression.¹⁴ Against this backdrop, PSMU has been identified as a key factor affecting individuals' psychological and physiological health.¹⁵ Particularly, PSMU fosters an environment of social comparison and appearance focus, creating a risk context for emotional problems such as depression and social anxiety.¹⁶ The widespread use of beauty-enhancing filters and photo-editing tools on social media further

normalises unattainable physical ideals, intensifying body dissatisfaction and emotional distress.

Existing studies have explored the relationship between PSMU and psychological distress, identifying insomnia and other sleep-related factors as common mediators in the relationship between PSMU and depressive mood.^{17 18} Perceived social support³ and rumination¹⁹ have also been reported as other mediators in studies. However, there is limited research on the mediating role of eating disorders in the relationship between PSMU and psychological distress, particularly regarding stress, anxiety and depression.

Therefore, this study aimed to explore the mediating role of eating disorders in the relationship between PSMU and psychological distress. College students were chosen as the subject group because they were at a critical period of rapid development in cognitive abilities, emotional regulation and social skills. Their frequent social media use and susceptibility to social comparison and societal pressures further increased the risk of eating disorders. The transitional nature of college life, involving adjustments to new environments, academic demands and social relationships, heightened vulnerability to the adverse effects of PSMU.^{20 21} By examining these mechanisms, this study aims to reveal the mediating mechanism between PSMU and psychological distress through the lens of eating disorders, providing a scientific basis for a deeper understanding of their relationship.

METHOD

Sample

The sample size for this study was determined based on the recommendations for SEM. According to Wolf *et al.*,²² SEM analyses generally require 10–20 participants per observed variable. With 34 observed variables in the current model, a minimum of 340 participants was deemed necessary. To ensure robust parameter estimation, a total of 500 questionnaires were distributed. A total of 466 responses were received, yielding a response rate of 93.2%. After excluding 12 invalid responses, the final effective sample size was 454. Eligible participants were college students aged 18 years or older. Individuals undergoing psychological treatment or taking psychiatric medications were excluded.

Procedure

This research targeted actively enrolled university students from a vocational college in Jiangxi, China, and used a cluster random sampling technique for selecting participants. The process began with using a comprehensive list of classes from the college to randomly select numerous classes until the total number of students in these selected classes satisfied the predefined sample size criteria. Students in the selected classes were invited to participate through a questionnaire link sent via class communication channels. Participants accessed the

online survey via the Wenjuanxing platform on their mobile devices or computers.

Ethical approval for this study was granted by the Ethics Committee of Nanchang First Hospital (approval number: KY2023046), and the study was registered with the China Clinical Trial Registry on 27 November 2023, under registration number ChiCTR2300078008. All participants provided informed consent prior to participation. The data collection phase of this study was conducted from December 2023 to January 2024.

Measures

Socio-demographics

The sociodemographic characteristics involved in this study include age and gender. Age was calculated based on the actual age of the respondents, while gender was categorised into male and female.

Depression anxiety stress scales: 21 items

In this study, symptoms of depression, anxiety and stress were assessed using the Depression Anxiety Stress Scales - 21 Items (DASS-21). The DASS-21 consists of 21 items, evenly distributed across three subscales²³—DASS-D, DASS-A and DASS-S—requiring respondents to rate their experiences over the past week on a 4-point Likert scale ranging from 0 (did not apply to me at all) to 3 (applied to me very much). Higher scores indicate more severe symptoms. The DASS-21 has been validated in Chinese-speaking populations, with Cronbach's alpha coefficients reported as 0.87 to 0.95 for the three subscales and 0.96 for the total scale.²⁴ In the current study, the Cronbach's alpha coefficient for the DASS-21 was 0.950.

SCOFF

Symptoms of eating disorders were measured using the SCOFF questionnaire, a concise screening tool developed²⁵ to identify symptoms related to anorexia nervosa and bulimia nervosa.²⁵ The questionnaire comprises five items probing the core characteristics of these eating disorders. A diagnostic threshold is applied, where two or more affirmative answers indicate the presence of an

eating disorder. The SCOFF questionnaire has demonstrated good internal consistency reliability in prior studies, with a Cronbach's alpha of 0.82.²⁶ In this study, the Cronbach's alpha coefficient for the SCOFF questionnaire was 0.687.

Bergen Social Media Addiction Scale

PSMU was measured using the Bergen Social Media Addiction Scale (BSMAS), a tool for assessing the degree of PSMU. Adapted from the Bergen Facebook Addiction Scale, the BSMAS comprises six items, each reflecting a fundamental aspect of addiction: salience, mood modification, tolerance, withdrawal, conflict and relapse. Assessments are conducted using a Likert scale, where participants indicate the frequency of these behaviours ranging from 'very rarely' to 'very often', with higher scores indicating greater levels of PSMU. The BSMAS has demonstrated strong psychometric properties among Chinese populations, with Cronbach's alpha coefficients ranging from 0.78 to 0.85 in previous studies, indicating acceptable to good internal consistency.²⁷ In this study, the Cronbach's alpha coefficient for the BSMAS was 0.900.

Statistical analysis

Descriptive statistics were first used to analyse the sociodemographic characteristics of the participants, including age and gender. χ^2 tests were used to examine gender differences in categorical variables. Since the data did not follow a normal distribution, Spearman's rank correlation analysis was employed to assess the relationships among the study variables, including PSMU, eating disorders and psychological distress (comprising stress, anxiety and depression). The hypothesised mediation model was analysed using generalised structural equation modelling (GSEM), implemented through the lavaan and semTools packages in R V.4.4.0. The model defined eating disorders as the mediating variable, PSMU as the independent variable and psychological distress as the dependent variable. Age and gender were incorporated into the

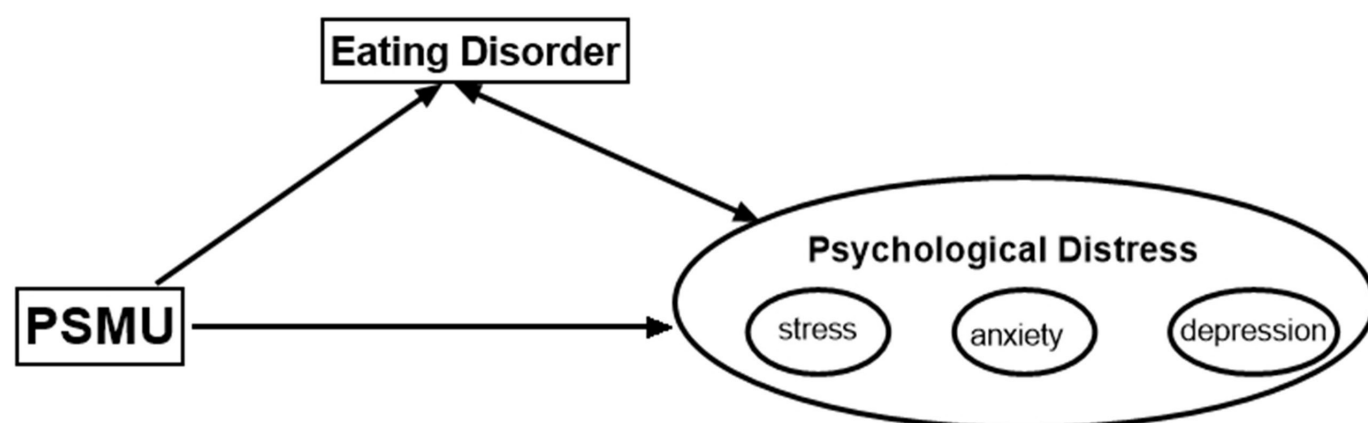


Figure 1 Description of the mediation models. Eating disorders are posited as a mediating factor in the relationship between problematic social media use (PSMU) on individuals' psychological distress (including stress, anxiety and depression).

Table 1 Analysis of basic characteristics

Characteristics	25% (Q1)	Median	75% (Q3)	Frequency (n)	Percentage
Age	18	19	20	454	
PSMU	12	17	20	454	
Anxiety score	2	9	14	454	
Depression score	2	9	14	454	
Stress score	4	9	16	454	
Gender					
Male				333	73.35
Female				121	26.65
Eating disorder				109	24.01

PSMU, problematic social media use.

mediation model as covariates to account for potential confounding effects (figure 1). The mediation model was evaluated using GSEM with maximum likelihood estimation, considering p values <0.05 as statistically significant. Bias-corrected (BC) 95% CIs for indirect effects were generated using 5000 bootstrap samples; significance was determined if the CI did not cross zero. All analyses were conducted using R V.4.4.0 to ensure the accuracy and reliability of the results.

RESULT

A total of 454 participants were included in the study. The sample was predominantly male. The psychological health indices, including anxiety, depression and stress, demonstrated a wide range of scores, with median values indicating moderate levels of distress. Additionally, nearly one-fourth of the participants exhibited tendencies towards disordered eating (table 1).

Gender differences in the prevalence of disordered eating symptoms were identified. A statistically significant difference was observed, with females showing a higher prevalence of disordered eating symptoms compared with males, as measured by the SCOFF questionnaire (table 2).

Spearman's correlation analysis identified statistically significant positive associations among PSMU, eating disorders and psychological health indices. PSMU was positively associated with eating disorders, as well as with stress, anxiety and depression. Similarly, eating disorders were positively associated with stress, anxiety and depression. Statistically significant correlations were observed among the psychological health indices, with stress, anxiety and depression showing particularly high

interrelationships. The composite psychological distress index was positively associated with stress, anxiety, depression, PSMU and eating disorders (table 3).

The GSEM analysis demonstrated that the model fit the data well. The fit indices, including χ^2 , CFI, TLI, RMSEA and SRMR, met the thresholds for acceptable fit.

In the measurement model, all latent variable loadings were statistically significant. The standardised loading for anxiety on psychological distress was 0.852 (95% CI 0.777 to 0.926), and for depression, it was 0.95 (95% CI 0.874 to 1.025).

In the structural model, PSMU was directly associated with eating disorders ($B=0.298$, 95% CI 0.260 to 0.336) and psychological distress ($B=0.202$, 95% CI 0.126 to 0.278). Eating disorders were significantly associated with psychological distress ($B=0.398$, 95% CI 0.340 to 0.456). Additionally, PSMU was indirectly associated with psychological distress through its relationship with eating disorders ($B=0.119$, 95% CI 0.083 to 0.155) (table 4).

DISCUSSION

This study aims to examine the mediating role of eating disorders in the relationship between problematic PSMU and psychological distress among Chinese college students. The findings indicate that both PSMU and eating disorders are associated with psychological distress, with eating disorders partially mediating the relationship between PSMU and psychological distress. This study contributes to the broader understanding of the associations between digital behaviours and mental health and highlights the need for integrated approaches in addressing these issues.

Table 2 Gender-stratified prevalence of eating disorders

Variable	Overall (n=454)	Females (n=121)	Males (n=333)	p value	χ^2
Prevalence of eating disorder	24.1% (109/454)	35.5% (43/121)	19.8% (66/333)	0.003	8.74

*p values were calculated using χ^2 tests.

Table 3 Results of Spearman's correlation analysis for PSMU, eating disorders and psychological distress

Variable	PSMU	Eating disorder	Stress score	Anxiety score	Depression score	Psychological distress
PSMU*	1					
Eating disorder†	0.298‡	1				
Stress score§	0.399‡	0.284‡	1			
Anxiety score§	0.404‡	0.310‡	0.844‡	1		
Depression score§	0.381‡	0.222‡	0.842‡	0.809‡	1	
Psychological distress	0.321‡	0.398‡	0.951‡	0.928‡	0.935‡	1

*Assessed using the Bergen Social Media Addiction Scale.

†Assessed using the SCOFF questionnaire.

‡Significant at the 0.01 level (two-tailed).

§Assessed using the Depression Anxiety Stress Scales-21 Item.

PSMU, problematic social media use.

Association between problematic social media use (PSMU) and psychological distress

There is a significant correlation between PSMU and psychological distress, consistent with previous studies that found PSMU positively correlated with depression, anxiety, stress and feelings of loneliness.²⁸ Furthermore, high frequency of social media use is related to symptoms of anxiety,²⁹ depression,²³ deteriorating psychological well-being,³⁰ reduced self-esteem,²⁹ psychological distress³¹ and loneliness.³²

The high rate of social media use among adolescents and young adults, coupled with their developmental vulnerability, may explain why they are more susceptible to psychological distress compared with adults.³³ A

systematic review covering 18 studies found a moderate but significant correlation between PSMU and depression, anxiety and stress.³⁴ Additionally, frequent use of social networking sites is linked to poor psychological functioning in children and adolescents,³⁵ possibly due to increased exposure to cyberbullying,³⁶ difficulty disengaging from media and allowing it to interfere with social relationships,³⁷ thus heightening the risk of experiencing negative emotional and sociopsychological consequences.³⁸ Particularly, studies focusing on college students or young adults have shown a significant correlation between PSMU and psychological distress in these groups.^{39 40}

Table 4 Generalised structural equation modelling (GSEM) results

Effect type	Estimate (B)	SE	z-value	P value	95% CI
Fit indices					
χ^2	30.896			0.014	
Df (df)	16				
CFI	0.988				
TLI	0.975				
RMSEA	0.045			0.594	(0.020, 0.069)
SRMR	0.014				
Latent variable loadings					
Stress score → psychological distress	1				
Anxiety score → psychological distress	0.852	0.038	22.405	<0.001	(0.777, 0.926)
Depression score → psychological distress	0.95	0.039	24.63	<0.001	(0.874, 1.025)
Direct effects					
PSMU → eating disorder	0.298	0.019	15.684	<0.001	(0.260, 0.336)
Eating disorder → psychological distress	0.398	0.029	13.724	<0.001	(0.340, 0.456)
PSMU → psychological distress	0.202	0.038	5.316	<0.001	(0.126, 0.278)
Indirect effects					
PSMU → psychological distress (via eating disorder)	0.119	0.018	6.611	<0.001	(0.083, 0.155)
<i>n</i> = 454					
PSMU, problematic social media use.					

Eating disorders and psychological distress

Eating disorders, a severe psychological concern, significantly impair physical health and disrupt sociopsychological functioning.⁴¹ Globally, research indicates varying prevalence rates of eating disorders, with higher rates reported in Western countries but a notable increase in Asian populations, which may reflect shifts in dietary habits and evolving beauty standards.^{42 43} *The findings of this study demonstrate associations between stress, anxiety, depression and eating disorders, which is consistent with prior literature.* Over 70% of individuals with eating disorders have a comorbid psychiatric disorder during the acute phase or over the course of the illness,⁴⁴ highlighting the close link between eating disorders and psychological distress.

The bidirectional relationship between eating disorders and psychological distress has been observed in previous studies. Psychological distress, including anxiety and depression, may exacerbate eating disorder symptoms, while disordered eating behaviours, such as binge eating and extreme dieting, can contribute to worsening psychological outcomes by reinforcing negative self-perceptions and emotional distress.⁴¹ *Common comorbidities among individuals with eating disorders include anxiety, depression and self-esteem-related concerns, all of which are associated with elevated scores of psychological distress.*⁴⁵ Furthermore, eating disorder behaviours such as binge eating and extreme dieting often serve as coping mechanisms for psychological stress and dissatisfaction, exacerbating psychological distress and creating a vicious cycle.⁴⁶

Cultural and societal factors are associated with the relationship between eating disorders and psychological distress. In East Asian countries, the societal emphasis on academic achievement and appearance creates distinct stressors that may contribute to disordered eating behaviours.⁴³

Problematic social media use (PSMU) and eating disorders

This study identified a positive correlation between PSMU and eating disorders, providing additional evidence of the association between social media usage habits and eating disorder behaviours.⁴⁷ Particularly, the significant association between PSMU and concerns about body image reveals a critical psychological issue.⁴⁸ The internet and social media platforms encourage users to create profiles with personal photos, leading to the widespread notion that attractiveness in online profiles may affect one's popularity.⁴⁹

The widespread dissemination of idealised body images on social media promotes the pursuit of a 'perfect' appearance. When users compare their online image with others on social media, it may lead to negative self-comparisons, driving some users to adopt extreme dietary behaviours to meet these unrealistic standards.⁵⁰ Moreover, dissatisfaction with body image may lead to eating disorders, such as anorexia nervosa and binge eating disorder,⁵¹ as well as decreased physical activity.

The findings of this study address an important gap in the existing literature by examining the complex

relationship between PSMU, eating disorders and psychological distress among Chinese college students. This study is the first to investigate the mediating role of eating disorders in the relationship between PSMU and psychological distress in a Chinese population. The evidence showed that PSMU was associated with psychological distress both directly and indirectly through its relationship with eating behaviours. Gender-specific differences were also observed, as social media content often targeted men and women differently. Men may face pressures related to muscularity ideals, leading to behaviours such as excessive exercise or use of performance-enhancing substances, while women were more likely to encounter pressures emphasising thinness and appearance.⁵² In particular, the promotion of beauty ideals like fair skin and slimness, which align with traditional Chinese aesthetics, could increase susceptibility to body dissatisfaction among individuals exposed to social media.⁵³

To mitigate the associations between PSMU and related eating disorders, universities and mental health professionals should implement digital literacy programmes that educate students on the potential risks of excessive social media use and promote healthier online behaviours. These programmes should not only focus on the dangers of social media but also teach students how to engage with digital platforms in a healthy, mindful way, reducing the risk of exacerbating body dissatisfaction and disordered eating behaviours. Intervention programmes should adopt a gender-sensitive approach, targeting the specific pressures faced by male and female individuals. For example, programmes for men could focus on addressing pressures related to muscularity ideals, while those for women could aim to challenge the emphasis on the thin ideal. Given the influence of social media algorithms in perpetuating harmful body image norms, psychoeducation programmes that focus on body image resilience, critical media consumption and effective coping strategies could help students develop healthier relationships with social media. Counselling services should also be equipped to address the interconnected issues of PSMU and eating disorders, providing integrated support to students facing these challenges. Clinicians should intervene aggressively, incorporating digital literacy and media awareness into treatment plans alongside traditional approaches like weight restoration.

Future research should continue to explore the underlying mechanisms of these relationships, including examining the roles of social comparison theory and the internalisation of body standards on social media. Additionally, future studies should investigate other contextual factors, such as cultural differences, that may contribute to the development of psychological distress in the context of PSMU. This could lead to more targeted and effective interventions, ultimately reducing the psychological risks associated with social media use and promoting better mental health outcomes among young adults.

Limitations

This study, while contributing valuable insights into the relationship between PSMU, eating disorders, and psychological distress, has certain limitations. One limitation is the reliance on self-reported data, which may introduce bias due to social desirability or inaccurate self-assessment. Additionally, the sample is limited to Chinese college students, which may affect the generalisability of the findings to other populations or cultural contexts.

Moreover, the use of a single method for data collection, specifically self-report questionnaires, raises concerns about common method bias. This bias may inflate or deflate the observed relationships between variables due to the shared measurement method. While this study did not directly address CMB through statistical tests, future research should consider employing multiple methods of data collection, such as combining self-reports with behavioural data or longitudinal studies, to mitigate these biases.

Conclusion

This study explores the mediating role of eating disorders in the relationship between PSMU and psychological distress among Chinese college students. The findings reveal that PSMU and eating disorders are significantly associated with increased psychological distress, with eating disorders partially mediating this relationship. These results highlight the complex interplay between digital behaviours and mental health issues in this population. However, the reliance on self-reported data and the cross-sectional design present limitations, particularly in establishing causality. Future research should employ longitudinal designs and use objective data sources to better understand these relationships and enhance the robustness of the findings. This study provides a foundational understanding that can guide further exploration into the mechanisms linking PSMU, eating disorders and psychological distress.

Contributors NH conceived the research design, performed a comprehensive literature search, managed data extraction, performed primary data analysis, led in interpreting the results and took the lead in drafting the initial manuscript. Guarantor: NH. SKL offered insights on the representation of findings in the manuscript. XX (corresponding author) played a significant role in the project's supervision, offered critical methodology advice and participated in the thorough review and revision of the manuscript. All authors have read and agreed to the final version of the manuscript. Guarantor: NH. NH accepts full responsibility for the work and the conduct of the study, had full access to the data, and controlled the decision to publish.

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Patient consent for publication Consent obtained directly from patient(s).

Ethics approval This study involved human participants and was approved by the Ethics Committee of Nanchang First Hospital (NO: KY2023046). Participants gave informed consent to participate in the study before taking part.

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