



Internet altruistic behavior and subjective well-being among Chinese college students: A cross-lagged analysis

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Abstract: We explored the relationship between Internet altruistic behavior (IAB) and subjective well-being (SWB) to estimate the effects and directionality of that predictive relationship between the two. Employing cross-lagged models we examined the interaction between IAB and SWB, among 339 college students (females = 53.10%, mean age = 19.02 years, SD = 1.56 years). The students were tracked twice in a period of 5 months. Results showed that college students' IAB increased significantly, while their SWB remained relatively stable during the two measurement periods. IAB and SWB had significant simultaneous and sequential correlations. SWB at Time 1 positively predicted IAB at Time 2, however, IAB at Time 1 did not significantly predict SWB at Time 2. Moreover, there was cross-gender invariance in the cross-lagged effect between IAB and SWB. Research topics in the current environment exhibit remarkable practical significance.

Keywords: Internet altruistic behavior; subjective well-being; cross-lagged analysis; college students

Introduction

With the rapid development of network technology, the Internet has become Internet psychology and behavior, of significance to human well-being. Its harmful, altruistic use is a serious concern. Internet altruistic behavior (IAB) refers to people's behavior of consciously helping others when surfing the Internet (Zheng et al., 2018). For instance, many individuals willingly share their expertise and knowledge online through tutorials, blogs, forums, and educational platforms. They create and curate content to help others learn and grow, without seeking any direct compensation. The rapidity and convenience of the Internet enable people to help, support, and share experiences with other Internet users, leading to the development of IAB which could benefit good interpersonal relationships (Liu et al., 2014), high levels of hope (Zheng, 2013), positive self-evaluation (Post, 2005), and improved subjective well-being (Zheng et al., 2018). College students are more involved in their IAB for positive social networks and interpersonal relationships, improving their network moral levels. But, its benefits to SWB cannot be assumed, and should be demonstrated. Consequently, the aim of this study was to investigate the impact of IAB on subjective well-being (SWB) and further examine if the aforementioned dimensions of IAB have differential effects on SWB through a cross-lagged design.

Internet altruistic behavior

IAB encompasses four distinct dimensions: Internet support, Internet guidance, Internet sharing, and Internet reminder (Zheng, 2013). IAB is a form of prosocial behavior. Many studies have shown that there is a close relationship between prosocial behavior and SWB (Dempsey et al., 2024; Gherghel & Takai, 2020; Gregori et al., 2024), however, the predictive direction of the relationship between the two is still controversial. Prosocial behavior is bound to have a certain impact on an

individual's perception and self-evaluation and positively affect their attitudes toward life and behavior patterns, which consequently help enhance happiness (Kesenheimer et al., 2023; Marshall et al., 2023). In networked environments, IAB has unique characteristics that differ from those of offline prosocial behavior (Zheng & Wang, 2017). Therefore, it is of great practical significance to conduct research on college students' IAB.

Subjective well-being

Subjective well-being (SWB) to personal assessments of quality of life according to user-defined standards, including life satisfaction, positive emotions, and negative emotions (Diener et al., 2018). Lyubomirsky et al. (2005) emphasized that when SWB is relatively strong, individuals are more sociable, enthusiastic, and altruistic in their life, work, and studies and have stronger immune systems and conflict resolution skills. In the research literature, there have been in-depth discussions on several variables related to SWB (e.g., prosocial behavior, interpersonal relationship, social support, sleep quality, etc.) (Hui, 2021; Weinberg et al., 2016; Yang et al., 2017; Zhang & Zhao, 2020). Previous studies have consistently shown that factors such as IAB have a positive impact on the SWB of adolescents (Zheng & Wang, 2017) of which college students from collectivist China are less well studied.

Prosocial behavior contributed to SWB improving personal happiness and life satisfaction (Ng & Diener, 2022). More recently, researchers studied the relationship between IAB and SWB and found that IAB significantly affected SWB; that is, the more IAB individuals have, the stronger their SWB is (Zheng & Wang, 2017; Zheng et al., 2018).

Individuals with high SWB will pay more attention to others in distress, promote empathy, and then engage in prosocial behavior because of their high positive emotions (Sabato & Bar-Ilan, 2023; Sara et al., 2019). Considering



the evidence mentioned above, it is reasonable to posit that subjective well-being (SWB) could potentially contribute to the increase of IAB among college students.

The present study

This study aims to investigate the quasi-causal relationship between IAB and SWB through a longitudinal cross-lagged analysis. We tested a directional model that included paths according to the theoretical predictions described above was tested against the baseline, and whether the relationship between the two differs across gender. Thus, we also determined the measurement invariance of the cross-lagged models in terms of gender. Thus, we put forward the following proposition:

Hypothesis 1. IAB at Time 1 might positively predict SWB at Time 2.

Hypothesis 2. SWB at Time 1 might positively predict IAB at Time 2.

Methods

Participants

Using the cluster sampling method, we selected 339 college students for study (females = 53.10%; mean age = 19.02 years; SD = 1.56 years). The sample included 159 men (46.90%) and 180 women (53.10%), of whom 78 (23.01%) were freshmen; 111 (32.74%) sophomores; 90 (26.50%) juniors; and 60 (17.70%) seniors. In addition to the questions on personal demographic information in general, these participants need to fill in the blanks. The question concerned the average time spent online every week: "How many hours per week do you use the Internet?" The average time spent online every week was 5.52 h (SD = 3.32) at the first assessment (Time 1, T1) and 5.69 h (SD = 3.06) at the second assessment (Time 2, T2). A total of 61 participants were lost over the two measurements, with a loss rate of 15.25%. Moreover, to ensure higher statistical efficiency, the sample size adheres to the recommended guidelines from Monte Carlo simulations, as outlined by [Tein et al. \(2013\)](#), regarding the statistical power of fit values.

Next, *t* tests were conducted on the samples of the lost and retained participants. The results showed no significant difference between the two sets of participants in the demographic variables and total IAB and SWB scores at T1, indicating that there was no non-structural loss in the sample. We also tested the normality of the data, and found that the two main variables (SWB and IAB) were normally distributed (skewness and kurtosis were less than 3; for the Shapiro–Wilk test, $p > 0.05$) and there were no extreme data values.

Measures

IAB Scale. The IAB scale compiled by [Zheng et al. \(2011\)](#) includes 26 items that are divided into four dimensions: Internet sharing (6 items), Internet support (9 items), Internet reminder (5 items), and Internet guidance (6 items). Responses are rated on a 4-point Likert scale. The higher the score, the higher the individual's IAB. The IAB score α coefficients at T1 and T2 were 0.94 and 0.96, respectively. This scale has been widely used in the Chinese population

and is considered to have good reliability and validity (e.g., [Peng et al., 2021](#); [Zheng et al., 2018](#)).

SWB Scale. Participants took the 5-item Life Satisfaction Scale developed by [Diener et al. \(1985\)](#). Items are rated on a 7-point Likert scale. A high score indicates that the respondents are highly satisfied with their lives. The α coefficients at T1 and T2 were 0.81 and 0.83, respectively. Scores of both scales were standardized, and SWB scores were subsequently calculated according to the following formula: life satisfaction score + positive emotion score – negative emotion score. Previous studies have pointed out that SWB includes life satisfaction and emotional components, and SWB can be measured through the above calculation methods ([Linley et al., 2010](#); [Sheldon & Elliot, 1999](#)).

Procedure

Participants were informed about the objectives and procedures of this survey through instructions provided at the beginning of the questionnaire. A written informed consent was obtained from each participant before data collection. The research protocol was approved by the Ethics Committee of Hainan University (clearance no. 2023-18).

Data analysis

Missing value and common method variance tests

Analyses were conducted using the Statistical Package for Social Sciences (SPSS), version 26.0. The common method variance test was performed as follows: First, strict control procedures were used, including anonymous completion of questionnaires, strict confidentiality for all data, an emphasis on scientific research, and positive and negative scoring. Secondly, as the data in this study relies on self-report measures completed by college students, there is a potential for common method bias. To address this concern, we employed Harman's single factor test method, which involves conducting confirmatory factor analysis to statistically control for any potential bias ([Harman, 1976](#)). The results showed that the fit index of the model did not achieve the desired effect ($\chi^2/df = 4.52$, RMSEA = 0.10, CFI = 0.47, TLI = 0.45, SRMR = 0.13). Therefore, the problem of common method variance was not significant in this study.

Cross-lagged path models of IAB and SWB

Once the questionnaire has been collected, the data is entered and processed using the Epidata software consistently. Paired *t* tests were conducted to compare the change from T2 to T1 in IAB and SWB. An alpha level of 0.05 (two-sided) was used to indicate statistical significance. Moreover, cross-lagged path models were used to examine longitudinal influences between IAB and SWB across college students as well as the stability of each construct over time. Incorporate them directly as a continuous variable within the path analysis model. These analyses were conducted using Mplus version 8.2 ([Muthén & Muthén, 2017](#)). Model fit indices included the chi-square, comparative fit index (CFI ≥ 0.95), Tucker–Lewis index (TLI ≥ 0.95), standardized root mean squared residual (SRMR ≤ 0.06) and root mean square error of

Table 1. Descriptive analysis of two tests of IAB and SWB ($M \pm SD$)

Variables	T1	T2	<i>t</i>
IAB	60.55 \pm 11.70	65.97 \pm 13.52	−8.22***
Internet sharing	14.95 \pm 3.34	13.99 \pm 2.84	5.50***
Internet support	17.35 \pm 4.57	23.18 \pm 6.37	−17.51***
Internet reminder	13.23 \pm 2.89	13.08 \pm 2.48	0.91***
Internet guidance	15.03 \pm 2.92	15.72 \pm 3.13	−3.98***
SWB	0.01 \pm 2.07	0.01 \pm 3.00	0.01

Note. T1 represents the pretest, T2 represents the post test, IAB represents Internet altruistic behavior, SWB represents Subjective well-being. *** $p < 0.001$.

Table 2. Correlation analysis between IAB and SWB

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Internet time	1												
2 T1IAB	−0.09	1											
3 T1Internet support	−0.09	0.80**	1										
4 T1Internet guidance	−0.07	0.87**	0.52**	1									
5 T1Internet sharing	−0.09	0.88**	0.52**	0.78**	1								
6 T1Internet reminder	−0.07	0.88**	0.54**	0.80**	0.80**	1							
7 T1SWB	−0.08	0.26**	0.20**	0.25**	0.23**	0.23**	1						
8 T2IAB	−0.06	0.55**	0.41**	0.49**	0.50**	0.49**	0.52**	1					
9 T2Internet support	−0.08	0.53**	0.41**	0.49**	0.47**	0.47**	0.50**	0.94**	1				
10 T2Internet guidance	−0.05	0.47**	0.33**	0.44**	0.45**	0.43**	0.47**	0.89**	0.75**	1			
11 T2Internet sharing	−0.02	0.50**	0.38**	0.43**	0.47**	0.45**	0.45**	0.90**	0.76**	0.79**	1		
12 T2Internet reminder	−0.07	0.44**	0.32**	0.39**	0.42**	0.39**	0.44**	0.88**	0.75**	0.77**	0.78**	1	
13 T2SWB	−0.07	0.17**	0.16**	0.18**	0.12*	0.12*	0.59**	0.24**	0.24**	0.21**	0.20**	0.17**	1

Note. IAB represents Internet altruistic behavior. SWB represents subjective well-being. * $p < 0.05$; ** $p < 0.01$.

approximation index ($RMSEA \leq 0.06$). Path coefficients are standardized coefficients (β), which can be considered small ($0.10 \leq \beta < 0.30$), moderate ($0.30 \leq \beta < 0.50$), or large ($\beta \geq 0.50$) (Cohen, 1988).

The maximum likelihood estimation (ML) method in Mplus 8.2 was used for testing cross-lagged effects between IAB and its four dimensions and SWB. Because gender, academic year, and time spent online did not have statistically significant relationships with the outcome variable, they were not included in the analysis¹. Multigroup analysis was used to examine whether the cross-lagged path between IAB and SWB was gender-equivalent. Using the same two sets of models, we built a baseline model (the parameters of the male and female student groups were estimated freely) and a limited model that limited the equality of two cross-lagged paths.

¹After adding gender, academic year, and online time spent to the analysis, all variables remain as in the original analysis. This inclusion will not significantly alter the results and will have a similar impact when gender, academic year, and online time spent are incorporated into the model.

Results

Descriptive statistics and *t* test

The results of paired sample *t* tests (see Table 1) showed that there was no significant change in college students' SWB from T1 to T2; however, the total IAB score and the scores of its four dimensions increased significantly ($p < 0.001$).

Correlation analysis between IAB and SWB

Table 2 shows that there is a significant correlation between IAB scores at T1 and T2 ($r = 0.55$, $p < 0.01$) and between SWB scores at T1 and T2 ($r = 0.59$, $p < 0.01$), indicating that college students' IAB and SWB were relatively stable across the two measurements. In addition, at the same time, IAB at Time 1 was positively correlated with SWB at Time 1 ($r = 0.26$, $p < 0.01$); and IAB at Time 2 was positively correlated with SWB at Time 2 ($r = 0.24$, $p < 0.01$).

Cross-lagged analysis of college students' IAB and SWB

We employed a short-term follow-up design to examine the causal relationship between IAB and its four dimensions

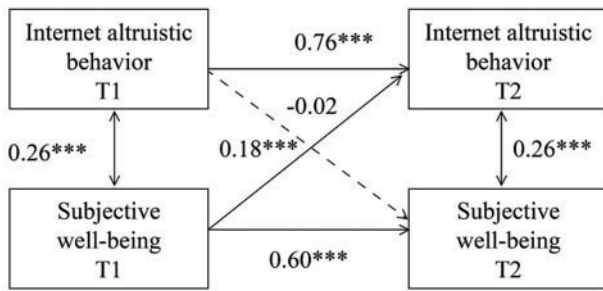


Figure 1. Cross-lagged model between Internet altruistic behavior and subjective well-being. Note: *** $p < 0.001$.

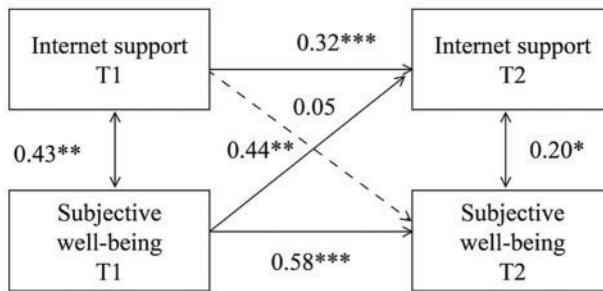


Figure 2. Cross-lagged model between Internet support and subjective well-being. Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

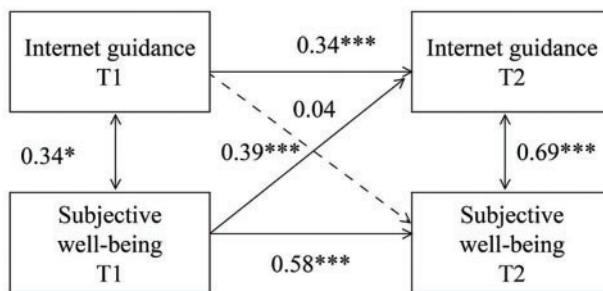


Figure 3. Cross-lagged model between Internet guidance and subjective well-being. Note: *** $p < 0.001$; * $p < 0.05$.

(i.e., Internet sharing, Internet support, Internet reminder, Internet guidance) with SWB via cross lagged analysis of variables. Moreover, we investigated whether there exists a gender difference in this relationship.

The results, which are depicted in Figures 1–5, showed that T1 SWB significantly positively predicted the total IAB score at T2 ($\beta = 0.41$, $p < 0.001$, see Figure 1) as well as its various dimensions—that is, Internet support ($\beta = 0.44$, $p < 0.001$, see Figure 2), Internet guidance ($\beta = 0.39$, $p < 0.01$, see Figure 3), Internet sharing ($\beta = 0.37$, $p < 0.001$, see Figure 4), and Internet reminder ($\beta = 0.37$, $p < 0.01$, see Figure 5) at T2. Thus, the higher the SWB at T1, the more the IAB at T2. Thus, Hypothesis 2 was supported.

Moreover, IAB ($\beta = -0.02$, $p > 0.05$, see Figure 1), Internet support ($\beta = 0.05$, $p > 0.05$, see Figure 2), Internet guidance ($\beta = 0.04$, $p > 0.05$, see Figure 3), Internet sharing ($\beta = -0.02$, $p > 0.05$, see Figure 4), and Internet reminder ($\beta = -0.02$, $p > 0.05$, see Figure 5) at T1 did not significantly predict SWB at T2. The results

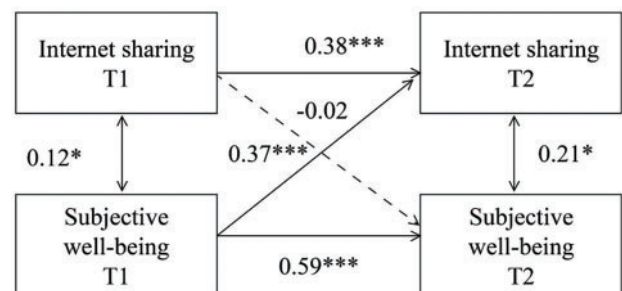


Figure 4. Cross-lagged model between Internet sharing and subjective well-being. Note: *** $p < 0.001$; * $p < 0.05$.

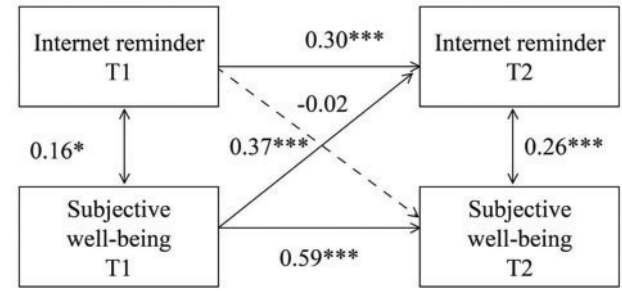


Figure 5. Cross-lagged model between Internet reminder and subjective well-being. Note: Residual items are not accounted for in the model. The data represented by the one-way arrow denotes the normalized regression coefficient β ; The solid line indicates a significant effect, while the dotted line represents an insignificant effect. *** $p < 0.001$; * $p < 0.05$.

showed that SWB predicted IAB; however, IAB did not predict SWB. Thus, Hypothesis 1 was not supported.

Test for gender difference in the cross-lagged models

The results showed that the baseline model could be fitted, $\chi^2(0) = 0.05$, RMSEA = 0.08, SRMR = 0.05, CFI = 0.99, and TLI = 0.99. The limited model was well adapted, $\chi^2(2) = 0.92$, RMSEA = 0.08, SRMR = 0.04, CFI = 0.98, and TLI = 0.98, and it was not significantly different from the baseline model ($\Delta\chi^2 = 0.87$, $\Delta df = 2$, $p > 0.10$, $\Delta RMSEA = 0.00$, $\Delta SRMR = 0.01$, $\Delta CFI = 0.01$, $\Delta TLI = 0.01$). This indicates that the cross-lagged models of college students' IAB and SWB demonstrated cross-gender invariance; that is, there was no significant gender difference in the cross-lagged relationship between college students' IAB and SWB.

Discussion

The present study found that SWB at T1 significantly predicted IAB at T2 (Hypothesis 2), indicating that individuals with higher SWB are likelier to demonstrate more IAB in the future. Aligned with the well-known saying “Feel good, do good” this notion reflects our inherent belief that engaging in positive actions online is connected to experiencing personal well-being (Yoon & Kim, 2024; Zheng et al., 2018; Zheng et al., 2016). Individuals with high SWB are optimistic toward various aspects of life, treat situations objectively and positively, and are often in positive mood states with high positive emotions and life satisfaction (Kwon & Kim, 2019). Fredrickson (1998) emphasized that positive emotions broaden the

scope of individuals' attention and help them build harmonious psychological and social resources so that they can pay more attention to others. With an increase in the intensity of positive emotions, individuals have better opportunities to help others relieve their plight, thereby producing helping behaviors (Dakin et al., 2022; Gregori et al., 2024). Previous studies have also found that individuals with high SWB demonstrate more goodwill and altruism (Brethel-Haurwitz et al., 2020). The results of the present study expand previous findings and indicate that SWB can promote altruistic behavior among individuals not only in real life but also on the Internet. Individuals with higher SWB are more willing to help others in online context, thereby demonstrating more IAB.

The present results also show that IAB at T1 did not effectively predict SWB at T2. This is inconsistent with previous research and the reasons may be as follows. First, although previous studies found that IAB contributed to greater SWB (Zheng & Wang, 2017; Zheng et al., 2016), they used cross-sectional design, which cannot reveal causal relationships between variables. Second, the impact of IAB on SWB may be modulated by other individuals or environmental variables. Studies have found that IAB can improve individuals' SWB by influencing online social support (Zheng et al., 2018); however, not everyone can improve their SWB by receiving online social support. For example, online social support did not significantly affect the SWB of individuals with a low sense of responsibility (Zheng & Wang, 2017). Therefore, it is necessary to conduct further research on the mechanisms underlying how IAB leads to enhanced SWB. Third, Aknin et al. (2012) emphasized that many SWB interventions were unsatisfactory because of the influence of positive adaptation; that is, individuals quickly adapted to positive changes and no longer felt happy. Thus, individuals may improve their SWB after engaging in IAB; however, as time passes, individuals will quickly adapt to IAB, and the happiness it generates may no longer be obvious, thereby leading to insignificant long-term effects of IAB on SWB.

Furthermore, the present study found no significant gender difference in the cross-lagged models of IAB and SWB through a multigroup analysis, which indicates a one-way predictive effect of SWB on IAB among both male and female students. This supports the hypothesis of gender similarity (Hyde, 2005); that is, men and women have more similarities than differences in psychological variables. The present results are consistent with this finding, which may be related to the uniqueness of the Internet environment and the convenience of Internet use. Studies have shown that, in the online context, due to the weakening of the bystander effect, gender differences have little impact on IAB. In addition, it is very convenient to use the Internet nowadays. When individuals possess a certain degree of happiness, in order to maintain or improve their happiness, both men and women conveniently seek support and help on various online platforms, thereby enhancing their IAB.

Implications for research and practice

Our study has several theoretical and practical implications. First, this study uses cross-lagged analysis to

investigate the predictive relationship between IAB and SWB, which to some extent, avoids the disadvantages of cross-sectional research and is conducive to exploring quasi-causal relationships between variables. The study found that SWB had a one-way predictive effect on IAB, and SWB was an antecedent variable affecting IAB. Specifically, the study revealed a positive relationship between SWB and both IAB and its four dimensions. Second, this research offers new contributions to research in cyberpsychology and positive psychology. These findings contribute to the current literature on IAB, provide valuable information on methods to improve the IAB of university students, and offer direction for future research. Third, the study has some practical implications: Individuals can improve their SWB through the guidance of positive psychology, college students are provided with group psychological counseling, which can improve their IAB. In addition, enhancing the understanding between IAB and SWB could help facilitate the execution of interventions that promote subjective well-being and cultivate the ability to experience happiness among college students. As a result, this could aid them in living up to their high prosocial values.

Limitations and future directions

There are some limitations in our study. First, although we adopted a cross-lagged design, only two time points were measured, which only preliminarily revealed the direction between the two variables and does not reflect the dynamic change in the relationship between IAB and SWB. Future research should measure multiple time points to further reveal how the relationship between IAB and SWB changes over time. Second, the participants of this study only consisted of college students. Therefore, it is necessary to be cautious in extending the present results to other groups. In future research, participants belonging to other age groups (e.g., middle school students) and occupations (e.g., office workers) should be selected to verify the present findings. Finally, the cross-lagged models in this study only explored the direct relationship between IAB and SWB, and failed to further investigate its internal mechanism. In the future, longitudinal mediating or moderating variables can be introduced to explore the complex mechanism underlying the relationship between IAB and SWB.

Conclusion

The present study not only demonstrated the causal relationship between IAB and SWB, but also explored the relationship between the four dimensions of IAB and SWB by means of a follow-up study for the first time. Thus, the findings show that SWB is an important antecedent variable that promotes college students' IAB and is consistent across genders. This is in line with the old proverb "Feel good, do good." Furthermore, this study extends the correlational research on IAB, offers empirical evidence for how to improve IAB among college students, indicates directions for future research, and proposes a promising outcome model of SWB and IAB that can be further explored by researchers.

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Author Contributions: The study was conceived and designed by Huiping Chen and Xianliang Zheng. Data were collected, and the results were analyzed and interpreted by Huiping Chen. The draft manuscript was prepared by Xianliang Zheng and Anguo Fu. All authors reviewed the results and approved the final version of the manuscript.

Availability of Data and Materials: The datasets generated during this study and used for analysis are available by contacting the corresponding author via e-mail.

Ethics Approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee at [anonymized for review] and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed Consent: Informed consent was obtained from all participants before the study.

Conflicts of Interest: The authors declare no conflicts of interest to report regarding the present study.

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