

BMJ Open Depression and its correlation with social support and health-promoting lifestyles among Chinese university students: a cross-sectional study

Zaili Tang ¹, Shuidong Feng,² Jing Lin³

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¹Department of Medical Record Management and Statistics, First Affiliated Hospital of University of South China, Hengyang, China

²Department of Epidemiology & Health Statistics, University of South China, Hengyang, China

³Xiangya International Academy of Translational Medicine, Central South University, Changsha, China

Correspondence to

Shuidong Feng;
shuidong_f@hotmail.com

ABSTRACT

Objectives To investigate the prevalence of depression in college students and determine how social support and healthy lifestyle factors are associated with depression in this population.

Design A cross-sectional design.

Setting A comprehensive university in Changsha, Hunan, South China. The study was conducted from May to June 2019.

Participants A total of 541 students at the comprehensive university.

Primary and secondary outcome measures The Zung Self-Rating Depression Scale, Social Support Rating Scale and Health-Promoting Lifestyle Profile-II (HPLP-II) were used to evaluate depression, social support and lifestyles, respectively, and analyse the mutual relationships among them.

Results Among the 541 participants, 161 (29.8%) experienced depressive symptoms, and there were significant gender-related and academic discipline-related differences in self-rated depression. The average social support score was 38.06 (38.06±7.52). The average HPLP-II score was 71.09 (71.09±11.47). A monofactor analysis showed that depression was correlated with social support and a healthy lifestyle. As demonstrated by logistic regression analysis, being a woman (OR=2.613, 95% CI: 1.541 to 4.43), inadequate social support (OR=0.912, 95% CI: 0.877 to 0.948), poor nutrition (OR=0.87, 95% CI: 0.775 to 0.977) and lack of self-actualisation (OR=0.644, 95% CI: 0.572 to 0.724) were significantly correlated with depression.

Conclusions Owing to the high prevalence of depression among Chinese university students, educational institutions must take measures such as providing compulsory mental health education courses and improving the psychological counselling services available to students.

INTRODUCTION

Depression, one of the most common psychological diseases, has become a major risk factor affecting physical and psychological health.¹ According to WHO statistics, globally, from 2005 to 2015, the number of people with depression increased by 18.4%. Although >300 million people worldwide

Strengths and limitations of this study

- Multivariate analysis was used to determine the risk factors for depression, which can form the basis of future intervention research.
- Owing to the cross-sectional design, it was not possible to establish causality in the relationships between risk factors and depression.
- The small sample recruited from a single institution limits the generalisability of the results.

experience depression, in China alone, this number has been reported to be 54 million.² Research has shown that depression is closely related to unhealthy lifestyles,³ physical illness,⁴ suicide^{5 6} and disease burden.⁷⁻⁹

College students, who are in the transitional period from puberty to adulthood, are a special group because they begin to face problems in various aspects, for example, issues in interpersonal relationships, academic pressure and financial difficulties, which they must face independently and make important life decisions. Psychological problems in this population are significant. Many studies have indicated that depression is the most widespread psychological disease among college students, with a prevalence of about 30% regardless of peacetime or public health emergencies like the COVID-19 pandemic.^{6 10-15} Although a recent study reported a depression rate of 69.2% during the COVID-19 pandemic,¹⁶ its small sample size hinders the generalisability of the findings. Overall, about 1.0%–4.0% of college students experience severe depression,^{11 17} which seriously affects various aspects of their lives, including academic performance and social function.¹⁸

As demonstrated by extensive previous research, the high depression prevalence among college students is related to their demographic characteristics.^{6 17 19} Studies have also

shown that depression is related to the quality and quantity of social support,^{18 20–26} which is an external protective factor for psychological diseases.²⁷ Early in the 1970s, the concept of social support was introduced in the psychiatric, sociological and medical literature, with researchers extensively examining the relationship between social support and physical and mental health using quantitative evaluation methods.^{28 29} These researchers believed that good social support is beneficial to health, while bad social relationships are harmful to physical and mental health. For example, one study confirmed that loneliness and a perceived lack of emotional support had the largest and most consistent associations across depression outcomes, with incidence rates of 1.55–9.97 and 1.23–1.40, respectively.³⁰ A recent study showed that students with poor social support, such as those who independently bore a large financial burden, lived alone or had poor relationships with their lovers, classmates or friends, had higher depression scores.³¹ Based on the previous studies, we believe that social support is an indispensable factor in the study of depression.

A health-promoting lifestyle is one in which self-initiated, continuous, daily activity is undertaken with the deliberate aim of increasing or promoting health and well-being.³² In a study by the WHO, lifestyle and social support played a key role in health.³³ Many recent studies have found that healthy lifestyles could reduce the incidence of depression in different groups, such as people with chronic illnesses, puerperae and older adults,^{32 34–37} who, because of their psychological vulnerability, generally lack the ability to take care of themselves; in this regard, they are similar to college students. The latest research shows that the cultivation of health-related behaviours may help in lowering depressive symptoms, which is related to unhealthy eating habits, inadequate exercise and sleep and prolonged computer exposure.^{38–40} However, few scholars have discussed the relationships between depression, social support and a series of individual health behaviours in college students.⁴¹ Considering that, based on the previous studies, the same indicator may differ across countries and cultures,^{42 43} there is a lack of China-specific reports on college students' health-promoting lifestyles and their association with depression.

Accordingly, this study investigates the prevalence rate of depression, degrees of social support, health-promoting lifestyles and their relevance to provide a scientific basis for health education and intervention in college students' depression.

METHODS

This cross-sectional, descriptive, correlational study explored depression, degrees of social support, health-promoting lifestyles and their relationships among college students in China.

Patient and public involvement

No patients or members of the public were involved in the design, execution, reporting or dissemination of this research.

Research object

The authors distributed self-administered questionnaires to students from a comprehensive university in Hunan Province, China, in May and June 2019.

Sample

The sample size was estimated according to the formula $N = u^2_{\alpha/2} \varpi(1-\varpi) / \delta^2$, which is commonly used in cross-sectional epidemiological studies. Previous studies have estimated that the average prevalence of depression among college students in China is approximately 30%^{44 45}; therefore, $\varpi = 30\%$. If $\delta = 0.05$ and $\alpha = 0.05$, the estimated sample would be 323 participants; if $\delta = 0.04$, the estimated sample would be 504 participants. We chose a larger sample size to ensure higher data accuracy. An additional 20% sample size was added to ensure that students who chose not to participate in the survey were included; thus, the final sample size was estimated to be approximately 600 individuals.

A simple random sampling method was used, and investigators were required to ensure that the sample's demographic characteristics were relatively uniform. Part-time students were excluded. A total of 600 individuals were recruited, 545 of whom signed the consent form and completed the questionnaire. After excluding four questionnaires owing to missing data (>5%), 541 valid questionnaires were analysed (effective recovery rate=90.17%).

Measures

The self-administered questionnaire included questions on demographic characteristics (self-designed) and instruments to evaluate depression, social support and health-promoting lifestyles.

Demographic section

The demographic characteristics of interest included age, gender, grade, area of residence, only-child status and family income, which was assessed by the investigator and categorised as follows: \leq ¥80 000 per year indicated a low income, ¥80 000–¥300 000 indicated a medium income and \geq ¥300 000 indicated a high income.

Zung Self-Rating Depression scale

The Zung Self-Rating Depression Scale (SDS)⁴⁶ is a norm-referenced measure used to screen adults for depressive disorders. It is widely used by Chinese researchers in the study of various populations^{47 48} and is suitable for college students.^{31 49} The SDS includes 20 items, which are scored between 1 (never or very infrequently) and 4 (most or all of the time), and can intuitively reflect respondents' subjective feelings for nearly 1 week. The total score, ranging from 20 to 80, can be converted to a standard score by multiplying it by 1.25. The higher the score, the more obvious the depression trend. A standard score ≥ 50 is regarded as demonstrating the presence of depressive symptoms.⁴⁶ Depression severity was determined by dividing the SDS score by 80. Accordingly, participants were divided into the following four categories: those < 0.5 were considered to have no symptoms of depression; those between 0.5 and 0.59 were assessed as having

mild depression; those between 0.6 and 0.69 were assessed as having moderate-to-severe depression and those >0.7 were considered to have severe depression.⁴⁶ The Cronbach's α coefficient of this scale was 0.905.

Social Support Rating scale

The Social Support Rating Scale (SSRS), developed by Xiao,⁵⁰ was used to measure the social support available to the participants. This instrument was specially designed for Chinese people and has high reliability ($r=0.92$).⁵⁰ It comprises 10 items with three subscales (objective support, subjective support and utilisation of support) and is scored from 1 to 4. The total score ranged between 11 and 64. The higher the score, the higher the social support level. The Cronbach's α coefficient of this scale was 0.820.

Health-Promoting Lifestyle Profile-II

The original Health-Promoting Lifestyle Profile (HPLP) was developed by Walker *et al*⁵¹ in 1987 and then revised to the HPLP-II, which is widely used with patients and healthy adults in the USA.⁵²⁻⁵⁴ Although college students are adults, their context is specific to campus life; thus, some of the scale's items (such as those included under the nutrition dimension) are not applicable. Therefore, this study modified the Chinese version of the HPLP-II to suit the college context. The adapted instrument included 25 items and six subscales (interpersonal relationships, nutrition, health responsibility, physical activity, stress management and self-actualisation). The total score ranged between 25 and 100; the higher the score, the better the health-promoting lifestyle. The Cronbach's α coefficient of the overall scale was 0.914, and the coefficients of the various subscales ranged from 0.772 to 0.895, demonstrating excellent reliability and validity.

Statistical analysis

All the data were input into a computer, a database was established and SPSS V.18.0 software (SPSS) was used for statistical analysis. A descriptive analysis of the participants' basic information was undertaken, and a χ^2 test and t-test were used to analyse the relationships between demographic characteristics, social support, healthy lifestyles and depression. Logistic regression was used to analyse the factors associated with depression. The level of statistical significant was set at $p<0.05$ (two-tailed).

RESULTS

Among the 541 participants, 212 were men (39.2%) and 329 were women (60.8%). The sample's average age was 20.74 years (range=15–38, SD=2.55). Specific information on the students' academic disciplines, year of study, place of residence and only-child status is shown in [table 1](#).

Among the 541 participants, the average SDS score was 34.99 (SD=9.431), ranging from 20 to 73. Specifically, 161 participants (29.8%) demonstrated depressive symptoms,

Table 1 Demographic characteristics of the sample (N=541)

Variable	Mean \pm SD/n (%)	Variable	n (%)
Age (years)	20.74 \pm 2.55	Residence	
Gender		City	297 (54.9)
Men	212 (39.2)	Country	244 (45.1)
Women	329 (60.8)	Only child	
Academic discipline		Yes	281 (51.9)
Medicine	197 (36.4)	No	260 (48.1)
Science and engineering	245 (45.3)	Family income	
Art	99 (18.3)	Low	146 (27.0)
Year		Medium	375 (69.3)
First	89 (16.5)	High	20 (3.7)
Second	256 (47.3)		
Third	70 (12.9)		
Fourth–fifth	48 (8.9)		
Postgraduate	78 (14.5)		

including 99 (18.3%) with minor depression, 51 (9.4%) with moderate depression and 11 (2.0%) with severe depression.

[Table 2](#) illustrates the relationship between participants' demographic characteristics and depression. The results showed that differences in self-rated depression by gender and discipline were statistically significant ($p<0.05$). The prevalence of depression among medical students was significantly higher than among students from other disciplines ($p<0.05$), the same as women than men. That is, on the contrary, men than women, other disciplines such as art and science and engineering students than medical students were less likely to suffer depression ($p<0.05$).

The average SSRS score was 38.06 \pm 7.52, ranging from 16 to 62. One of the questions is the source of comfort and concern you received in an emergency: 43 students (7.9%) said that they did not have any source, and 498 people chose one or more of them, including 455 (84.1%) chose parents and relatives, 419 (77.4%) chose classmates or friends, 198 chose lovers, 128 (23.7%) chose teachers, 21 (3.9%) chose psychological counsellors and 14 (2.6%) chose other groups. The average HPLP-II score was 71.09 \pm 11.47, ranging from 45 to 100 ([table 3](#)).

According to the analysis, participants who did not have depression had statistically significantly higher social support and health-promoting lifestyle scores (total scores as well as individual factor scores) than those with depression (both $p<0.01$). As shown by the results of the Pearson's correlation analysis, depression tendency had a significant negative correlation with the factor and total scores of the SSRS and HPLP-II ($p<0.01$), as shown in [table 4](#).

Taking depression as the dependent variable and demographic characteristics and SSRS and HPLP-II factor and total scores as independent variables, further analysis was

Table 2 Prevalence of depression by participants' demographic characteristics

Variable	No depression (%)	Depression (%)	χ^2	P value
Age (years)				
<20	137 (74.9%)	46 (25.1%) ^a	4.212	0.122
20–22	185 (69.5%)	81 (30.5%) ^a		
>22	58 (63.0%)	34 (37.0%) ^a		
Gender				
Men	169 (79.7%)	43 (20.3%)	14.977	<0.001
Women	211 (64.1%)	118 (35.9%)		
Discipline				
Medicine	118 (59.9%)	79 (40.1%) ^a	15.985	<0.001
Science and engineering	188 (76.7%)	57 (23.3%) ^b		
Art	74 (74.7%)	25 (25.3%) ^b		
Year of study				
First	71 (79.8%)	18 (20.2%) ^a	6.327	0.176
Second	178 (69.5%)	78 (30.5%) ^a		
Third	50 (71.4%)	20 (28.6%) ^a		
Fourth–fifth	32 (66.7%)	16 (33.3%) ^a		
Postgraduate	49 (62.8%)	29 (37.2%) ^a		
Residence				
City	209 (70.4%)	297 (29.6%)	0.005	0.942
Country	171 (70.1%)	244 (29.9%)		
Only child				
Yes	197 (70.1%)	84 (29.9%)	0.005	0.944
No	183 (70.4%)	77 (29.6%)		
Family income				
Low	95 (65.1%)	51 (34.9%) ^a	3.179	0.204
Medium	269 (71.7%)	106 (28.3%) ^a		
High	16 (80.0%)	4 (20.0%) ^a		

Each superscript letter (a or b) denotes a subset of the titled categories whose column proportions do not differ significantly from each other at the 0.05 level, but differ significantly from each other at the 0.05 level within two superscripts.

conducted by using a binary logistic regression model. According to the results, being a woman (OR=2.613, 95% CI: 1.541 to 4.43), inadequate social support (OR=0.912, 95% CI: 0.877 to 0.948), poor nutrition (OR=0.87, 95% CI: 0.775 to 0.977) and lack of self-actualisation (OR=0.644, 95% CI: 0.572 to 0.724) were significantly correlated with depression (table 5).

DISCUSSION

Depression

In recent years, depression has become the most common psychological disease among college students, with a rising annual incidence rate that significantly influences their learning and living and hinders their potential.⁵⁵ This study demonstrated that depression is prevalent among Chinese college students: 29.8% of the participants experienced depressive symptoms. This result is in

agreement with the findings of a systematic analysis from 2016, which reported a depression prevalence of 27.2% (95% CI: 24.7% to 29.9%)⁶ across 43 countries, and a Chinese study from the same year, wherein the depression prevalence was 23.8% (95% CI: 19.9% to 28.5%).⁵⁶ This confirms that the present results reflect real-life scenarios.

As shown by our results, the possibility of female college students experiencing depression was 2.61 times higher than that of male students, slightly higher than what was reported in the previously mentioned meta-analysis based on the literature from multiple countries (1.95 times).⁵⁷ This result may have been caused by basic differences between men and women, such as with regard to physiological characteristics, social conditions and gender roles.² According to a previous study, there are larger gender differences in major depression in nations with

Table 3 Factor and total scores on the SSRS and HPLP-II (N=541)

Variable	Range of actual score (min–max)	Average score (mean±SD)	Percentage
SSRS score	16–62	38.06±7.52	0.61
Objective support	1–22	8.67±3.16	0.39
Subjective support	10–28	20.68±3.91	0.74
Utilisation of support	3–12	8.71±2.92	0.73
HPLP-II score	45–100	71.91±11.47	0.72
Interpersonal relationships	5–20	14.62±3.43	0.73
Nutrition	4–16	11.61±2.53	0.73
Health responsibility	7–16	11.80±1.34	0.74
Physical activity	4–16	9.37±2.94	0.59
Stress management	6–16	11.80±2.44	0.74
Self-actualisation	4–16	12.72±2.74	0.80

HPLP-II, Health-Promoting Lifestyle Profile-II; SSRS, Social Support Rating Scale.

greater gender equality maybe because of fierce job competition.⁵⁷ China's government is pursuing such gender equality.⁵⁸

Regarding academic disciplines, the prevalence of depression among medical students was 40.1%, significantly higher than among students from other disciplines. This result is consistent with the range of 13.10%–76.21% reported in a systematic review of Chinese medical students, but higher than the average of 32.74%.⁵⁹ It is also significantly higher than the 27.2% prevalence in a study covering 47 countries.⁶ Furthermore, the prevalence observed in this study was higher than the 28.0% reported in a global meta-analysis among medical students⁶⁰ and the 30.6% reported in Cameroon, Africa.¹¹ However, it was lower than the 65% reported in Egypt⁶¹ and 66.8% in Liaoning province, China.¹⁹ Overall, medical students from China have a higher prevalence of depression than those from other parts of the world. In this study, most medical students were sophomores, fourth to fifth

years, or postgraduates; the high prevalence of depression in this group may be attributable to a few reasons. From sophomore year onward, medical students have heavier academic loads, and competition among students becomes fiercer, while during the fourth to fifth and post-graduate years, students must focus on learning and clinical practice at the same time.⁶² For example, one study showed that exposure to patients' suffering and death was associated with higher levels of depression and anxiety in medical students.⁶³

Social support and healthy lifestyles

The participants' average social support score was 38.06±7.52, which is similar to the social support score (38.29±4.37) among female college students previously reported in China⁶⁴ and at upper middle level of the total score. The objective support score was relatively low, accounting for only 0.39% of the total score, which signifies that the objective social support available to Chinese college students is generally low. Both

Table 4 Relationship between Zung SDS scores and factor and total scores on the SSRS and HPLP-II

Variable	Pearson's correlation with total SDS score	No depression (mean±SD)	Depression (mean±SD)	t	P value
SSRS	-0.549*	40.28±6.47	32.84±7.24	11.266	<0.001
Objective support	-0.333*	9.26±2.95	7.26±3.22	6.764	<0.001
Subjective support	-0.461*	21.67±3.48	18.35±3.88	9.368	<0.001
Utilisation of support	-0.556*	9.34±2.09	7.22±2.05	10.854	<0.001
HPLP-II	-0.686*	75.84±9.99	62.66±9.19	14.855	<0.001
Interpersonal relationships	-0.559*	15.49±3.34	12.57±2.69	10.707	<0.001
Nutrition	-0.469*	12.21±2.39	10.20±2.27	9.057	<0.001
Health responsibility	-0.397*	12.08±1.23	11.14±1.34	7.884	<0.001
Physical activity	-0.335*	9.85±2.87	8.24±2.79	6.048	<0.001
Stress management	-0.567*	12.48±2.26	10.20±2.06	11.423	<0.001
Self-actualisation	-0.685*	13.73±2.18	10.31±2.38	16.223	<0.001

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

HPLP-II, Health-Promoting Lifestyle Profile-II; SDS, Self-Rating Depression Scale; SSRS, Social Support Rating Scale.

Table 5 Results of the logistic regression analysis for correlates of depression

Variables	β	Wald χ^2	P value	OR	OR (95% CI)
Gender (women:men)	0.96	12.709	<0.001	2.613	1.541 to 4.43
Social support	-0.092	21.574	<0.001	0.912	0.877 to 0.948
Nutrition	-0.139	5.528	<0.001	0.87	0.775 to 0.977
Self-actualisation	-0.441	54.017	<0.001	0.644	0.572 to 0.724
Constant	8.766	86.57	<0.001	6413.893	

the total score and the diverse factors of social support had a negative correlation with depression and depression trends ($p<0.01$), which again revealed that minimal family support, poor interpersonal relationships with companions, lack of emotional support, inadequate utilisation of support, and negative interactions gradually affect psychological perception, and, in turn, develop into depressive symptoms.^{18 30}

The results of this questionnaire survey showed that the proportion of psychological counsellors as a source of comfort and concern is low, with only 21 participants (3.9%). According to a study of Chinese international students in the USA,⁶⁵ this population is more likely to experience psychological health problems than others, and most of them never seek professional psychological help. Many studies have shown that this scenario is tightly correlated with the prevalent perception in China, that hardships are meant to be endured and psychological health problems are not diseases; thus, patients may feel embarrassed when seeking help.^{66 67} Consequently, people tend to suppress their emotions. In view of this situation, it is necessary to strengthen the attention paid to students' psychology in both Chinese families and school education, treat psychological health problems correctly, and encourage students to communicate and seek help actively.

The average score of health-promoting lifestyles was relatively high (71.91±11.47). However, among the six subscales, the average score of physical activity was low, accounting for only 59% of the total score. With the continuous improvement of material living standards and technological advancements, contemporary college students have shown a declining annual trend in terms of exercise. Since physical activity influences psychological health,⁶⁸⁻⁷¹ physical education at universities should focus on improving students' physical condition. In addition, the total and individual factor scores of health-promoting lifestyles were negatively correlated with depression and depression trends ($p<0.01$), which is consistent with the results of a foreign study, that is, healthy behaviour is related to depression, although the scale used was different.⁴¹

Factors associated with depression

In the multivariate analysis, being a woman, inadequate social support, poor nutrition and failing to experience self-actualisation were independent risk factors for depression. It was shown that college students' depression is independently related to unhealthy nutritional habits, and strengthening healthy daily routines and dietary habits can lower their depression risk. The failure to experience self-actualisation observed in this study could have been associated with an

inherent problem with Chinese education, which is that it is not in touch with the social reality. Most students, who do not understand the concrete, substantive correlation between learning and their future work and lives, have no long-term objectives and are relatively blind to the future, which, in turn, breeds anxiety and depression. Therefore, it is necessary to advocate quality-oriented education, create social practice opportunities and associate education with practice in universities.

Furthermore, studies have shown that school-based prevention programmes have the potential to reduce mental health burden and advance positive public health outcomes.⁷² In view of the risk factors confirmed by this study, we have several suggestions to offer. First, schools should provide compulsory mental health education courses and ensure the quality of psychological education. Second, there is a need to organise a variety of campus and social activities concerning psychological education, encouraging men and women to cooperate with each other. Third, university psychological counselling centres should improve the psychological counselling services on offer; conduct regular schoolwide psychological screening, strengthen the psychological crisis prevention and intervention mechanism, establish the 'four-level' prevention system of schools, departments, classes and dormitories, and focus on students with low socioeconomic status and insufficient social support. Specific intervention measures include interpersonal counselling,⁷³ positive group psychotherapy⁷⁴ and sports interventions.⁷⁵ Finally, there is a need to gradually establish an effective system of psychological crisis prevention, intervention, referral to medical institutions and rehabilitation to ensure the early detection, early treatment and early rehabilitation of patients with depression. The practical significance of this study is that the results and suggested intervention measures can be submitted to university administrators and psychological counselling services to guide measures to promote college students' mental health.

Limitations

This study has the following shortcomings. First is the small sample recruited from a single institution, which hinders the generalisability of the results. Second is an inherent limitation of cross-sectional studies, that is, the inability to make causal inferences regarding risk factors and diseases where these exist concurrently. Third, if the sample had included individuals from other important areas, such as the sociology department, the discussion of social factors would have been more in-depth. Finally, our investigation was confined only to depression, and other psychological problems common

among college students (eg, anxiety) were not included. In future research, it will be necessary to adopt the principle of positive psychology to examine and help change college students' mentality and behavioural habits.

CONCLUSIONS

According to our study, 29.8% of college students experienced depressive symptoms, and their social support and healthy lifestyles were at the middle-upper and good levels, respectively. Female college students with an inadequate social support and poor nutritional habits who feel no self-actualisation are most easily affected by depression.

Contributors ZT: designed the study and drafted the manuscript. JL: collected, cleaned and verified the data. ZT and SF: analysed the data, contributed to the interpretation of the results and the critical revision of the manuscript for important intellectual content. All authors have read and approved the final manuscript.

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Patient consent for publication Not required.

Ethics approval The study was approved by the Medical Ethics Committee of the First Affiliated Hospital of University of South China. The consent form was at the beginning of the questionnaire; once the participants had signed the consent form, they moved on to answering the questions. No identifying details were collected.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement All data relevant to the study are included in the article or uploaded as supplementary information. No additional data are available.

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ORCID iD

Zaili Tang <http://orcid.org/0000-0002-9846-9290>

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