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yunshu sun
Guangdong Mental Health Center
Fei Wang
Guangdong Mental Health Center
XinYan He
Department of Cardiology
Sili Jiang
Guangzhou Center for Disease Control and Prevention
Wang Yu-Xian
Department of Cardiology
zhou yanhong
Department of Cardiology
chen yuhan
Department of Cardiology
hai Deng
Department of Cardiology
cailan Hou
houcl1975@163.com

Guangdong Mental Health Center

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Hypertension Outperforms Obesity in Predicting Obstructive Sleep Apnea Risk in Non-Obese Chinese Adults: The Added Role of Anxiety in Community Screening

Yun-Shu Sun[a#]

Fei Wang, MD[a#]

Xin-Yan He[b#]

Si-Li Jiang[c#]

Yu-Xian Wang[b]

Yan-Hong Zhou[b]

Yu-Han Chen[b]

Hai Deng[b]*

Cai-Lan Hou, MD, PhD[a]*

[#] These authors contributed to the paper equally.

* Corresponding authors:

Cai-Lan Hou, MD, PhD

Guangdong Mental Health Center, Guangdong Provincial People's Hospital (Guangdong Academy of Medical Sciences), Southern Medical University

Email: houcl1975@163.com

Address: Room 709, No.123, Huifuxi Road, Yuexiu District, Guangzhou, Guangdong, 510000, PR China

Hai Deng, MD

Department of Cardiology, Guangdong Cardiovascular Institute, Guangdong Provincial People's Hospital (Guangdong Academy of Medical Sciences), Southern Medical University

Email: doctordh@hotmail.com

Address: No. 106 Zhongshan Rd II, Yuexiu District, Guangzhou, Guangdong, 510080, China

Affiliations:

a Guangdong Mental Health Center, Guangdong Provincial People's Hospital (Guangdong Academy of Medical Sciences), Southern Medical University, Guangzhou, Guangdong, China

b Department of Cardiology, Guangdong Cardiovascular Institute, Guangdong Provincial People's Hospital (Guangdong Academy of Medical Sciences), Southern Medical University, Guangzhou, Guangdong, China

c Guangzhou Center for Disease Control and Prevention (Guangzhou Health Supervision Institute), Guangzhou, Guangdong, China

Ethical Statement

Written informed consent was obtained from all participants prior to their involvement. The study was approved by the Guangzhou Medical Ethics Committee of the Chinese Medical Association.

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Declaration of Interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Abstract

Purpose: This study aimed to identify key predictors of Obstructive Sleep Apnea (OSA) risk in Chinese adults with predominantly normal to overweight BMI, and to determine whether anxiety serves as an independent risk marker or mediator in the association between hypertension and OSA risk.

Methods: A community-based cross-sectional study was conducted among 11,844 adults aged ≥35 years in Guangzhou, China. Hypertension was defined by self-reported diagnosis or antihypertensive medication use. Anxiety symptoms were assessed using the Zung Self-Rating Anxiety Scale (SAS). High OSA risk was determined by the Berlin Questionnaire. Group least absolute shrinkage and selection operator (LASSO) regression and path analysis were used to evaluate predictors and mediation effects, adjusting for age, sex, BMI, lifestyle factors, and other psychological measures.

Results: The prevalence of hypertension was 29.4%, and 36.5% of participants were classified as high OSA risk. Group LASSO regression identified hypertension as the strongest predictor (odds ratio [OR] = 10.75), while BMI showed a much smaller effect (OR = 1.27). Anxiety was independently associated with OSA risk (OR = 1.07, *p* < 0.001). Path analysis revealed that anxiety mediated only 1.7% of the total hypertension–OSA association, indicating a minor but statistically significant mediating role.

Conclusion: In this non-obese community cohort, hypertension far outperforms BMI in predicting high OSA risk. Anxiety adds modest independent predictive value and may serve as a useful clinical red-flag indicator, but its mediating effect is small. Integrated screening targeting both vascular and psychological factors is warranted in similar Asian populations.

Key words: Hypertension, Anxiety, Obstructive Sleep Apnea, Mediation Analysis

1 Introduction

Obstructive Sleep Apnea (OSA) has emerged as a major public health concern [1]. Historically, research on OSA risk factors has focused heavily on obesity due to its role in narrowing the upper airway. However, this paradigm may not fully apply to southern Chinese populations, where the risk of OSA remains high even among individuals with normal to modestly elevated BMI [2]. These findings suggest that other risk factors, including hypertension and psychological factors, may play a more critical role. However, this obesity-centric paradigm is challenged in Asian populations, where a significant proportion of OSA occurs in individuals with normal or modestly elevated BMI. This discordance suggests that non-anthropometric mechanisms, particularly vascular and psychological pathways, may drive OSA risk in this context, yet their relative contributions remain poorly quantified.

Epidemiological evidence confirms a robust bidirectional relationship between hypertension and OSA. Mechanistically, this association is thought to involve sympathetic nervous system hyperactivity, endothelial dysfunction, and renin-angiotensin-aldosterone system (RAAS) activation triggered by OSA-induced hypoxia, though reverse causality via vascular-mediated upper-airway changes has also been proposed [3].

Psychological factors, particularly anxiety and depression, are central to the cardiometabolic nexus of OSA and hypertension [4]. Despite these well-documented pairwise associations, the tripartite relationship between hypertension, anxiety, and OSA remains incompletely understood-especially whether anxiety acts as a mediator in the hypertension-OSA link. Additionally, most mediation analyses exploring psychological factors in OSA have focused on trauma-exposed populations, where psychopathology, like Post-Traumatic Stress Disorder and depression, is central [5]. For example, one study found that depression mediates the relationship between PTSD and OSA in firefighters [6], leaving a gap in research on community-dwelling adults with cardiometabolic risk profiles.

To address these knowledge gaps, this study investigates the relationship between anxiety, hypertension, and the risk of OSA, using data from a large community-based sample of adults aged 35 years and older in Southern China. We aim to: (1) identify key predictors of OSA risk; (2) quantify the direct effect of hypertension on OSA risk;

and (3) explore whether anxiety accounts for part of the association between hypertension and OSA risk.

2 Methods

2.1 Participants

This study was based on data from the Guangzhou Heart Study, a community-based investigation conducted from July 2015 to August 2017 using multi-stage stratified cluster sampling in Guangzhou, southern China. The study targeted residents aged 35 years and older. Participants were recruited based on the following inclusion criteria: (1) being registered residents of Guangzhou according to the city's household registration system; (2) individuals aged 35 years or older; and (3) having resided in the selected community for at least six months prior to participation. The exclusion criteria were as follows: (1) having mental or cognitive disorders, such as dementia, comprehension difficulties, or severe communicative impairments; (2) having mobility issues, including severe paralysis; (3) being pregnant or breastfeeding; (4) currently undergoing treatment for malignant tumors; and (5) not being a resident of the selected communities.

2.2 Recruitment and Assessment

Demographic and health-related information collected included age, gender, marital status, BMI, education level, hypertension status, hyperthyroidism, smoking history, alcohol consumption, and hypnotic use.

Life events were evaluated using the Life Event Scale (LES), a self-report instrument developed [7] for assessing the impact of life events in Chinese populations. The scale consists of 48 items covering four dimensions: family-related events, work/study-related events, social-related events, and personal health events. In a recent validation study of Chinese college students the LES demonstrated good internal consistency (Cronbach's $\alpha = 0.85$) and satisfactory test-retest reliability ($r = 0.79$). The scale also showed a significant positive correlation with depressive symptoms ($r = 0.42$, $p < 0.001$)[8].

Depressive symptoms were measured using the Center for Epidemiologic Studies Depression Scale (CES-D), originally developed by Radloff [9]. The scale comprises 20 items assessing four domains: depressive mood, positive emotions, somatic

symptoms and psychomotor retardation, and interpersonal problems. Convergent validity with the PHQ-9 was confirmed ($r = 0.74$, $p < 0.001$)[10].

Anxiety symptoms were assessed using the Self-Rating Anxiety Scale (SAS) [11], developed by Zung and validated in Chinese populations . The scale includes 20 items covering psychological and somatic symptoms of anxiety.

We identified individuals at high risk of OSA by using the Berlin Questionnaire (BQ). The BQ consists of 10 items that can be divided into three categories: snoring, daytime somnolence, hypertension and BMI. The Korean-language version of the BQ demonstrated acceptable reliability (Cronbach's $\alpha = 0.64$-0.78) and strong test-retest stability ($r = 0.92$) . The Chinese-language version, validated in a clinical sample of 820 patients, achieved a sensitivity of 81.2 % and specificity of 75.6 % for OSA diagnosis [12].

2.3 Statistical analysis

Descriptive statistics were used to summarize the demographic and clinical characteristics of participants. To determine the amount of overlap between psychopathologies, we performed Pearson correlation analyses and Spearman's rank correlation. Binary logistic regression was performed to examine factors associated with high risk of OSA. First, a single full multivariate model was constructed with simultaneous entry of all covariates: age, gender, hypertension, hypnotic use, alcohol consumption, BMI, marital status, education, smoking, LES score, CES-D score, and SAS score. A hierarchical three-step regression was then conducted: Model 1 included age, gender, and hypertension; Model 2 added lifestyle-related variables; and Model 3 further included psychological measures.

To account for multicollinearity, we implemented group least absolute shrinkage and selection operator (LASSO) regression models [13]. We used group LASSO regression [14] to allow sets of dummy variables derived from categorical variables to be selected together. Additionally, we performed bootstrapping methods with 10,000 replicates, and calculated the consistency value (%), defined as the proportion of models in which each feature was selected. A feature with a consistency value of 80% or higher was considered meaningful.

Exploratory path analysis was conducted to examine the interrelationships among hypertension, psychological factors, and OSA risk. Given the cross-sectional nature of the data, all path models were interpreted as exploratory analyses examining patterns

of associations rather than causal mediation [15]. Two path models were specified: a single-predictor model with anxiety as the sole explanatory variable, and a multi-predictor model simultaneously incorporating anxiety, life-event stress, and depressive symptoms as parallel explanatory variables. Both models included hypertension as the independent variable, Berlin Questionnaire score as the outcome variable, and adjusted for age, gender, BMI, alcohol consumption, smoking status, education level, and marital status as covariates.

For the single-predictor model, traditional fit indices (e.g., CFI, RMSEA) are not informative and are therefore not reported [16]. For the multi-predictor model, model fit was assessed using the root mean square error of approximation (RMSEA), comparative fit index (CFI), and Tucker-Lewis Index (TLI), with RMSEA ≤ 0.08, CFI ≥ 0.90, and TLI ≥ 0.90 indicating acceptable fit [17, 18]. The significance of indirect effects was tested using bootstrapping with 1,000 resamples, generating 95% bias-corrected confidence intervals.

All statistical analyses were performed using SPSS ver. 22.0 software and R version 4.0.2. A two-tailed p-value < 0.05 was considered statistically significant.

3 Results

3.1 Description of sample

A total of 11,844 participants were enrolled in this study (Table 1) The mean age was 58.51 years. The mean LES score was 0.18, the mean CES-D score was 2.57, the mean SAS score was 29.48, and the mean BMI was 24.00 kg/m².

In terms of sociodemographic characteristics, 35.0% of participants were male, 85.4% were married, and 62.3% had an education level of junior high school or below. The prevalence of hypertension was 29.4%, and that of hyperthyroidism was 4.9%. A total of 21.3% of participants were ever-smokers, and 21.4% reported alcohol consumption. Hypnotic medication use was reported in 0.6% of participants, and 36.5% were classified as being at high risk of obstructive sleep apnea based on the Berlin Questionnaire.

3.2 Correlational Analysis

Correlation analyses demonstrated significant intercorrelations among the study variables (Figure 1 and Figure 2). Gender showed the strongest positive correlation with BQ scores, whereas age was weakly and negatively correlated with BQ scores.

Hypertension was positively correlated with SAS scores. BMI was inversely associated with CES-D scores, and alcohol consumption showed weak positive correlations with both CES-D scores and SAS scores.

Among the four main outcome measures, the strongest correlation was observed between CES-D and SAS. Other notable correlations included BQ and SAS, BQ and CES-D, LES and CES-D, LES and SAS, and BQ and LES.

3.3 Factors Associated with High Risk of OSA

Multivariate logistic regression was conducted to identify independent factors associated with high OSA risk (Table 2). Hypertension was the strongest risk factor. Other significant risk factors included male sex, higher BMI, current smoking, and higher SAS scores. Higher educational level was identified as a protective factor. Age, alcohol consumption, hypnotic use, LES score, CES-D score, and marital status were not independently associated with OSA risk.

Hierarchical logistic regression was performed to explore the association between hypertension and OSA risk following sequential adjustment for covariates (Table 3). In the unadjusted model, hypertension was strongly and positively associated with OSA risk. This association remained statistically significant after adjustment for hypnotic use, alcohol use, BMI, marital status, educational level, and smoking status, and after further adjustment for age, gender, LES, CES-D, and SAS, suggesting a robust and independent relationship between hypertension and OSA risk.

In the fully adjusted model, significant risk factors included male sex, higher BMI, smoking, and higher SAS scores. Higher educational level and older age were protective factors.

3.4 LASSO Regression Analysis

Using LASSO regression with cross-validation, the optimal model retained 11 predictive variables from an initial pool of 20 features. Hypertension was the strongest positive predictor of high OSA risk. Male sex, married status, and smoking showed moderate positive associations, while alcohol consumption exhibited a weak negative association. Psychological indicators including SAS, LES, and CES-D were retained in the predictive model. Age showed a negligible negative association. Several variables were excluded during regularization, such as specific marital status subgroups, diabetes, liver diseases, educational level, and hypnotic use. Notably, the

effect size of hypertension (OR = 10.75) substantially exceeded that of BMI (OR = 1.27), underscoring its dominant role in this cohort where obesity prevalence is low.

3.5 Path Analysis

Two structural equation models were constructed and estimated based on 11,844 observations. Bootstrap resampling with 1,000 successful replications was used to compute standard errors and bias-corrected confidence intervals. All models included age, gender, BMI, alcohol consumption, smoking status, education level, and marital status as covariates.

In the single-predictor model (Figure 3) hypertension was significantly associated with higher anxiety scores ($\beta = 0.058$, $p < 0.001$). Among covariates, gender, BMI, education level, and marital status showed significant associations with anxiety scores, while age, alcohol consumption, and smoking status did not.

Anxiety scores were significantly associated with OSA risk ($\beta = 0.138$, $p < 0.001$). Hypertension exerted a strong direct effect on OSA risk ($\beta = 0.456$, $p < 0.001$). The indirect effect of hypertension on OSA risk via anxiety was statistically significant, accounting for approximately 1.7% of the total effect. The squared multiple correlation coefficients were 0.018 for anxiety and 0.302 for OSA risk, indicating that the model explained 1.8% of the variance in anxiety and 30.2% of the variance in OSA risk.

The multiple-mediator model, which simultaneously incorporated SAS, LES, and CES-D as parallel mediators, yielded poor model fit (CFI = 0.332, RMSEA = 0.209, SRMR = 0.079). In this model, anxiety remained a significant predictor of OSA risk ($\beta = 0.125$, $p < 0.001$), while life event stress and depressive symptoms did not show significant independent effects. Consistent with the single-mediator model, only anxiety demonstrated a significant indirect effect (indirect effect = 0.008, $p < 0.001$), whereas the indirect effects of life event stress and depressive symptoms were non-significant. These findings indicate that anxiety, rather than other psychological factors, serves as the primary mediator in the hypertension-OSA relationship.

4 Discussion

This study challenges the prevailing obesity-centric paradigm of obstructive sleep apnea (OSA) by demonstrating that, in a large community-based sample of southern

Chinese adults with a mean BMI of 24.0 kg/m², hypertension substantially outperforms BMI as the dominant predictor of high OSA risk[19]. While obesity remains the cornerstone of OSA pathophysiology in Western populations, our findings indicate that vascular mechanisms may supersede anthropometric factors in populations where extreme obesity is uncommon. The fully adjusted logistic regression model showed that hypertension carried an odds ratio of 10.75 for high OSA risk, compared with 1.27 for BMI, and group LASSO regression identified hypertension as the only variable selected with 100% consistency[20]. These results compel a re-evaluation of OSA risk stratification in non-obese Asian cohorts, shifting the clinical lens from body habitus to cardiovascular status.

Our findings are consistent with, yet extend beyond, previous studies that have established a bidirectional relationship between hypertension and OSA. However, most prior investigations have been conducted in predominantly obese or overweight populations, where the effect of BMI often overshadows other risk factors[21]. In contrast, our cohort exhibited a mean BMI of 24.0, a level considered within the normal-to-overweight range in Chinese criteria, yet the prevalence of high OSA risk reached 36.5%. This prevalence is comparable to that reported in Western populations with substantially higher BMI profiles, reinforcing the notion that non-obesity-related mechanisms are particularly relevant in Asian populations[22]. Furthermore, while several studies have examined the role of psychological factors in OSA, few have systematically quantified their relative contributions alongside vascular factors in a community-based sample using penalized regression methods. Our LASSO approach provides a robust ranking of predictor importance, offering a methodological advance over traditional stepwise selection.

The pathophysiological primacy of hypertension over obesity in this context is plausibly explained by vascular-mediated upper airway compromise. In the absence of substantial pharyngeal fat deposition, sympathetic nervous system overactivity and renin-angiotensin-aldosterone system dysregulation—hallmarks of established hypertension—can promote fluid retention, upper airway mucosal edema, and reduced pharyngeal luminal caliber[23], thereby increasing collapsibility during sleep. Conversely, OSA-induced intermittent hypoxia exacerbates nocturnal sympathetic surges, creating a self-perpetuating vicious cycle that sustains both conditions. This vascular-autonomic pathway may operate more independently of BMI in relatively lean populations, whereas in obese individuals, mechanical fat loading often

overwhelms these vascular contributions. Our data lend empirical support to this hypothesis, as the effect size of hypertension remained robust across all sequential adjustment models, including those accounting for lifestyle and psychological confounders. Moreover, the vascular remodeling and endothelial dysfunction associated with chronic hypertension may directly impair upper airway dilator muscle function, further compromising pharyngeal patency.

Regarding psychological factors, our path analysis revealed that anxiety exerted a statistically significant but clinically modest mediating role[24] in the hypertension-OSA association, accounting for only approximately 1.7% of the total effect. This modest magnitude suggests that anxiety should not be overinterpreted as a primary causal pathway. Instead, its independent association with OSA risk positions it as a valuable, easily ascertainable clinical red-flag indicator[25] rather than a mechanistic cornerstone. Previous studies have demonstrated that anxiety is associated with autonomic nervous system imbalance, including reduced heart rate variability and heightened sympathetic tone, which may exacerbate nocturnal respiratory instability. Additionally, anxiety-related hyperarousal during sleep may lower the respiratory arousal threshold[26], leading to more frequent apneic events. For the community physician managing a hypertensive patient, the presence of elevated anxiety symptoms—even at subclinical levels—may serve as an adjunctive cue to heighten suspicion for coexisting OSA, particularly when obesity is not overt. Notably, our multiple-mediator model incorporating life event stress and depressive symptoms yielded poor fit, reinforcing that anxiety, among the psychological constructs examined, is the most relevant marker in this specific vascular-sleep interplay, while depressive symptoms may operate through distinct or overlapping pathways that warrant further investigation[27]. This finding aligns with recent evidence suggesting that anxiety and depression have differential effects on sleep architecture and autonomic regulation[28].

From a community screening perspective, our findings offer a pragmatic, resource-conscious strategy for OSA case detection in similar Asian settings. Universal referral based on BMI would be inefficient in populations with low obesity prevalence, as it would miss a substantial proportion of at-risk individuals. We propose a two-step algorithmic approach: first, prioritize hypertensive individuals regardless of BMI status[29]; second, within this hypertensive subgroup, incorporate a brief anxiety assessment to further refine risk stratification. This integrated vascular-psychological

screening model, derived directly from our LASSO-selected predictors, could optimize the positive predictive value of community-based OSA identification without necessitating costly or time-consuming sleep studies. Several previous studies have advocated for targeted screening strategies in primary care settings, but most have relied on obesity-related criteria or symptom-based questionnaires without incorporating psychological markers. Our findings extend this literature by demonstrating that psychological assessment—particularly anxiety—adds incremental value beyond traditional anthropometric and lifestyle factors. The feasibility of this approach is enhanced by the brevity and low cost of anxiety screening tools, making them suitable for routine use in busy community clinics.

Several limitations should be acknowledged. First, the cross-sectional design precludes inference of causal relationships; longitudinal studies are needed to confirm the temporal sequence between hypertension, anxiety, and OSA. Second, the study did not use polysomnography as the gold standard for OSA diagnosis, which may lead to potential misclassification of OSA risk despite the validation of the Berlin Questionnaire in Chinese populations. Third, self-reported height and weight data may affect the accuracy of BMI calculations, introducing minor measurement bias. Fourth, the study population was limited to permanent Guangzhou residents, which may limit the generalizability of the findings to other regions or ethnic groups in China. Fifth, we did not assess objective blood pressure measurements or hypertension subtypes, which may provide additional insights into the vascular mechanisms underlying the observed associations. Additionally, we did not collect data on anxiety or depression diagnoses, relying instead on symptom scales, which may not fully capture clinically diagnosed psychopathology. Despite these limitations, the strengths of this study include a large community-based sample size, comprehensive assessment of multiple psychological and cardiovascular factors, and the use of advanced statistical approaches including group LASSO and path analysis to validate the findings from multiple analytical perspectives. Future research should employ longitudinal designs with objective sleep and cardiovascular measurements to confirm our findings, and evaluate whether antihypertensive therapy combined with anxiety management attenuates OSA progression[30] in non-obese populations. Moreover, randomized controlled trials testing integrated vascular-psychological interventions are needed to establish the clinical utility of our proposed screening approach.

Table 1: Clinical and sociodemographic characteristics of participants.

Clinical Characteristics	Mean (SD)
Age	58.51 (11.71)
BMI	24.00 (3.53)
LES	0.18 (0.45)
CES-D	2.57 (3.82)
SAS	29.48 (4.96)
Sociodemographic and Health-Related Characteristics	**n (%)**
Sex (Male)	4142 (35.0)
Marital status (Married)	10112 (85.4)
Education (Junior high or below)	7382 (62.3)
Hypertension	3482 (29.4)
Hyperthyroidism	575 (4.9)
Ever smoked	2519 (21.3)
Alcohol consumption	2540 (21.4)
Hypnotic use	70 (0.6)
BQ (High OSA risk)	4325 (36.5)

Note: BMI, Body Mass Index; LES, Life Event Scale; CES-D, Center for Epidemiologic Studies Depression Scale; SAS, Self-Rating Anxiety Scale; BQ, Berlin Questionnaire; SD, Standard Deviation.

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Table 2: Results of Logistic Regression Analysis.

Variables	B	OR (95% CI)	P value
Age	−0.004	0.996 (0.991-1.002)	0.221
Gender	0.275	1.317 (1.128-1.537)	<0.001
Hypertension	2.375	10.752 (9.629-12.005)	<0.001
Hypnotic use	0.612	1.843 (0.779-4.364)	0.164
Alcohol consumption	0.091	1.095 (0.861-1.392)	0.46
LES	0.05	1.051 (0.924-1.195)	0.447
CES-D	−0.018	0.982 (0.960-1.004)	0.105
SAS	0.072	1.074 (1.061-1.088)	<0.001
BMI	0.235	1.265 (1.243-1.288)	<0.001
Married	−0.107	0.899 (0.762-1.061)	0.207
Education	−0.274	0.761 (0.674-0.858)	<0.001
Smoking	0.209	1.232 (1.035-1.467)	0.019

Note: OR, odds ratio; CI, confidence interval; LES, Life Event Scale; CES-D, Center for Epidemiologic Studies Depression Scale; SAS, Self-Rating Anxiety Scale; BMI, body mass index.

Table 3: Association of Hypertension and Other Factors with High OSA Risk.

Variables	Model 1 OR (95% CI)	P	Model 2 OR (95% CI)	P	Model 3 OR (95% CI)	P
Age	0.982 (0.978–0.986)	<0.001	0.987 (0.982–0.991)	<0.001	0.986 (0.981–0.990)	<0.001
Gender	1.427 (1.305–1.561)	<0.001	1.211 (1.071–1.368)	0.002	1.301 (1.149–1.474)	<0.001
Hypertension	11.905 (10.753–13.158)	<0.001	10.526 (9.434–11.765)	<0.001	10.752 (9.615–12.048)	<0.001
Hypnotic use	—	—	1.776 (1.013–3.115)	0.045	1.144 (0.636–2.058)	0.653
Alcohol use	—	—	0.885 (0.732–1.070)	0.209	0.901 (0.742–1.093)	0.288
BMI	—	—	1.180 (1.164–1.196)	<0.001	1.192 (1.176–1.209)	<0.001
Married	—	—	0.929 (0.815–1.059)	0.271	0.984 (0.861–1.124)	0.812
Education	—	—	0.749 (0.682–0.823)	<0.001	0.720 (0.655–0.792)	<0.001
Smoking	—	—	1.212 (1.053–1.394)	0.007	1.199 (1.040–1.382)	0.012
LES	—	—	—	—	1.021 (0.923–1.129)	0.688

CES-D	—	—	—	—	1.013 (0.997–1.030)	0.120
SAS	—	—	—	—	1.074 (1.061–1.088)	<0.001

Note: OR, odds ratio; CI, confidence interval; BMI, body mass index; LES, Life Event Scale; CES-D, Center for Epidemiologic Studies Depression Scale; SAS, Self-Rating Anxiety Scale.

Model 1: Adjusted for age, gender

Model 2: Further adjusted for BMI, smoking, alcohol, education, marital status, hypnotic use.

Model 3: Further adjusted for LES, CES-D, SAS.

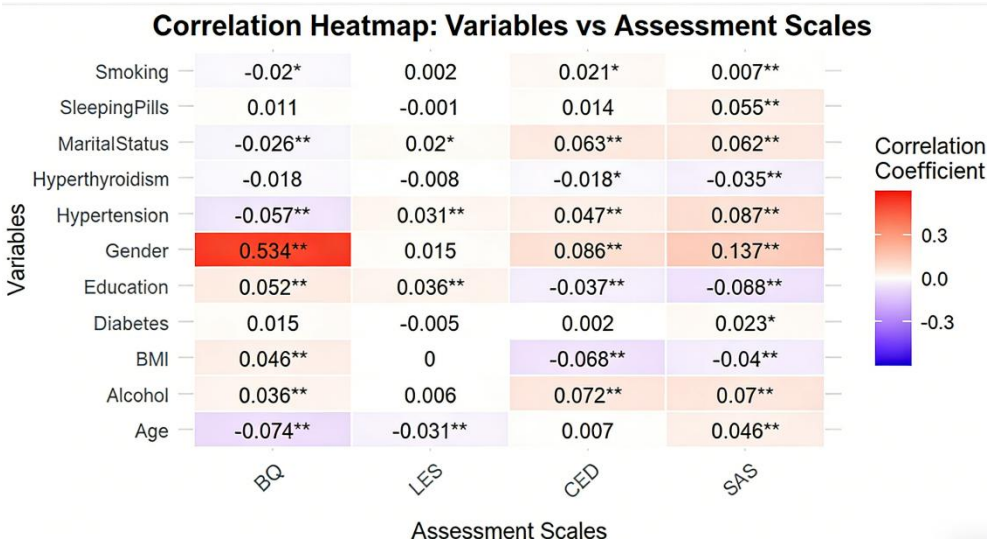


Figure 1. Correlation Heatmap of Demographic and Clinical Variables with Assessment Scales

Correlations were assessed using Pearson's correlation coefficient. The color intensity and circle size represent the magnitude of the correlation coefficient. *p < 0.05; **p < 0.01. LES, Life Event Scale; CES-D, Center for Epidemiologic Studies Depression Scale; SAS, Self-Rating Anxiety Scale; BQ, Berlin Questionnaire.

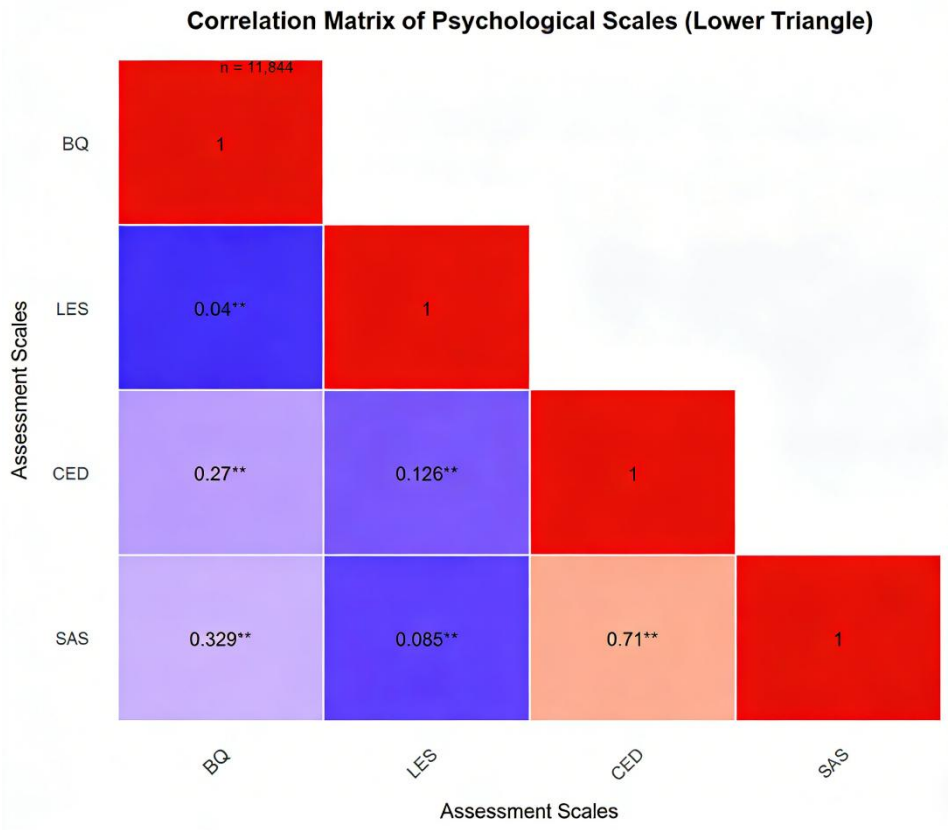


Figure 2. Correlation Matrix among Psychological Assessment Scales.

Correlations were assessed using Spearman's rank correlation coefficient. The color intensity and circle size represent the magnitude of the correlation coefficient. *p < 0.05; **p < 0.01. LES, Life Event Scale; CES-D, Center for Epidemiologic Studies Depression Scale; SAS, Self-Rating Anxiety Scale; BQ, Berlin Questionnaire.

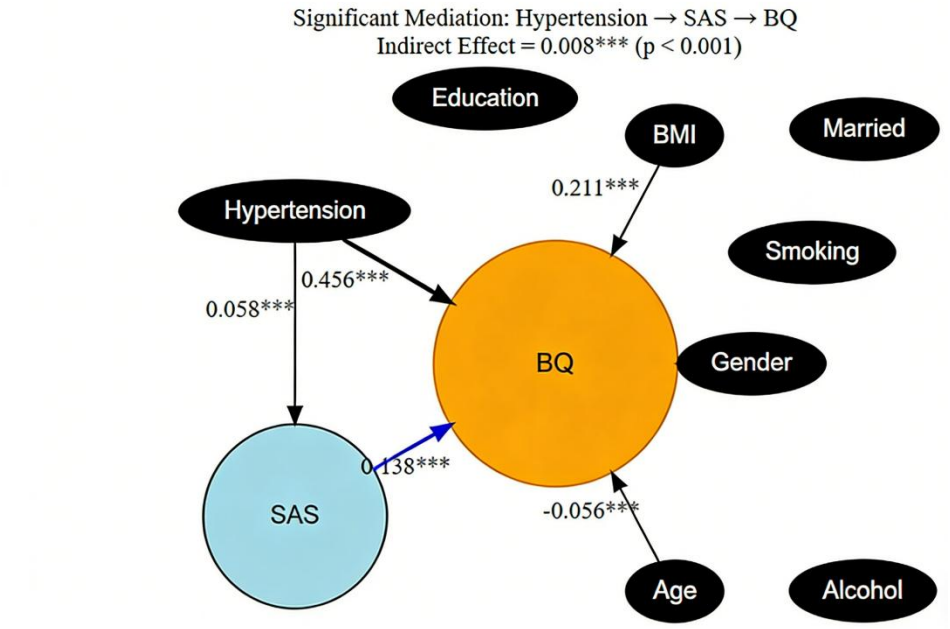


Figure 3. Path analysis model for the mediating effect of anxiety.

The single-mediator model demonstrated model (CFI = 1.000, RMSEA = 0.000, SRMR = 0.000). Path coefficients are presented as standardized regression coefficients. The indirect effect of hypertension on BQ through SAS was 0.008 (95% bias-corrected bootstrap CI [0.004, 0.012]), *p* < 0.001. Model adjusted for age, gender, BMI, alcohol consumption, smoking status, education level, and marital status. BQ, Berlin Questionnaire; SAS, Self-Rating Anxiety Scale; BMI, body mass index.

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