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Factors Associated with Lifestyle Modification among Chinese Adults with Hypertension: A Cross-sectional Study

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Abstract:

Introduction/Objective: Lifestyle modification is essential for hypertension management; yet adherence remains suboptimal among working-age adults in China. Evidence regarding psychosocial and cognitive factors associated with lifestyle modification in this population is limited. This study aimed to describe the level of lifestyle modification and to examine the association of life stress, hypertension knowledge, self-efficacy, and family relationships among adults with hypertension.

Methods: A cross-sectional study was conducted among 108 adults with hypertension recruited from the cardiovascular outpatient department of a tertiary hospital in China. Data were collected using validated self-report instruments. Descriptive statistics, Pearson's correlation analysis, and multiple linear regression were used for data analysis.

Results: The mean lifestyle modification score was 44.04 (SD = 8.91) out of a possible 80. In the multivariable regression model (adjusted R^2 = 0.431), higher perceived life stress was negatively associated with lifestyle modification (β = -0.237, p = 0.005), whereas hypertension knowledge (β = 0.157, p = 0.036) and self-efficacy (β = 0.457, $p < 0.001$) were positively associated. Family relationships were not significantly associated with lifestyle modification after adjustment.

Discussion: The findings suggest that lifestyle modification among adults with hypertension is associated with both psychosocial and cognitive factors. Stress, knowledge, and self-efficacy appear to be particularly relevant factors for understanding variations in lifestyle modification, whereas family relationships may operate through indirect pathways.

Conclusion: Lifestyle modification among adults with hypertension remains suboptimal and is associated with perceived stress, hypertension-related knowledge, and self-efficacy. These findings highlight potential priorities for nursing assessment and patient support; however, causal inferences cannot be drawn due to the cross-sectional design. Future longitudinal and interventional studies are needed to further clarify these relationships and inform the development of effective nursing interventions.

Keywords: China, Hypertension, Lifestyle modification, Life stress, Hypertension knowledge, Self-efficacy, Family relationship, Working-age adults.

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1. INTRODUCTION

1.1. Background

The global burden of hypertension continues to increase, affecting approximately 2.64 billion people worldwide [1]. In China, young and middle-aged adults account for 67.5% of the estimated 244.5 million individuals with hypertension, and prevalence among the younger population is rising at rates two to three times higher than those observed among older adults [2, 3]. Hypertension remains the leading modifiable risk factor for cardiovascular disease (CVD) and all-cause mortality globally, with CVD accounting for more than 40% of all deaths in China [1, 4]. Despite this growing burden, younger adults demonstrate lower levels of hypertension awareness, treatment, and control compared with older populations. Accordingly, the 2024 updated Chinese hypertension guidelines emphasize the importance of addressing hypertension prevention and management among working-age adults [5].

Lifestyle modification is consistently recommended as a first-line strategy for hypertension management across major international and national guidelines [5, 6]. Nevertheless, evidence suggests that working-age adults with hypertension tend to maintain poorer lifestyle behavior than older adults. They are more likely to report unhealthy dietary patterns, insufficient physical activity, and higher levels of life stress related to work and family responsibilities, and they often participate in social activities in which alcohol consumption plays an important role [7, 8]. These patterns suggest that both individual circumstances and social environments may be associated with challenges in adopting guideline-recommended lifestyle behaviors in this population.

This perspective is consistent with the Individual and Family Self-Management Theory (IFSMT), a nursing-relevant theoretical framework that conceptualizes health behavior in chronic conditions as being shaped by contextual and self-management process factors [9]. Guided by the IFSMT, the present study focused on four independent variables that align with key theoretical domains and are amenable to nursing assessment and intervention. Life stress was conceptualized as a contextual factor, whereas hypertension knowledge, self-efficacy, and family relationship were conceptualized as self-management (SM) process factors. Lifestyle modification was defined as a proximal outcome within the IFSMT and served as the dependent variable in this study, which may be associated with both contextual and process-related factors.

Previous studies have reported that stress management is associated with better engagement in lifestyle modification behaviors among individuals with hypertension [10]. In addition, Chinese adults with hypertension have been shown to have limited knowledge regarding the development, prognosis, and complications of hypertension, and higher levels of hypertension-related knowledge have been associated with better adherence to lifestyle recommendations [11, 12]. Family-related factors have also been linked to self-management processes. For example, family encouragement and support have been associated with higher self-efficacy, which in turn has been associated with self-management behaviors in individuals with hypertension [13]. Similarly, positive family relationships have been associated with greater family support and healthier lifestyle behaviors [14-17]. Stable and supportive family relationships may facilitate healthier behavior adoption by shaping daily routines, emotional support, and shared health-related practices [18, 19].

Grounded in the IFSMT and supported by evidence that nursing interventions can enhance lifestyle modification behavior among individuals with hypertension [20, 21], examining the relationship between life stress, hypertension knowledge, self-efficacy, family relationships, and lifestyle modification represents an important preliminary step toward the development of theory-informed nursing interventions. However, prior studies examining factors associated with lifestyle modification in hypertension have largely focused on general or older adult populations, with limited attention to working-age adults and limited application of nursing theoretical frameworks such as the IFSMT [22].

In China, the rapid increase in hypertension prevalence among working-age adults, coupled with suboptimal prevention and control, highlights the need for focused investigation of lifestyle modification behaviors in this group. In rapidly developing cities such as Wenzhou, working-age adults constitute the core workforce and often face dual responsibilities to family and society, resulting in lifestyle patterns that differ from those of older adults. Given their longer anticipated life expectancy, understanding lifestyle modification and its associated factors in this population is particularly important. From a nursing perspective, assessing lifestyle modification level and its associated factors among working-age adults with hypertension is essential to inform targeted assessment, education, and supportive interventions aimed at reducing future chronic disease burden.

1.2. Purposes of the Research

The purposes of this study are as follows: (1) To describe the level of lifestyle modification among adults with hypertension; and (2) To examine the association between life stress, hypertension knowledge, self-efficacy, family relationship, and lifestyle modification in the study population.

2. METHODS

2.1. Study Design

This study used a descriptive cross-sectional design to examine the association between psychosocial and cognitive factors and lifestyle modification among adults with hypertension. The cross-sectional approach allowed for the assessment of relationships among variables at a single point in time. Therefore, temporal sequencing and causal inference were not assumed. The study was guided by the IFSMT, in which life stress was conceptualized as a

contextual factor, while hypertension knowledge, self-efficacy, and family relationship were conceptualized as self-management process factors. Lifestyle modification was defined as the proximal outcome.

2.2. Participants

Participants were recruited from the cardiovascular outpatient department of the First Affiliated Hospital of Wenzhou Medical University (WMU), a tertiary teaching hospital in China. Eligible participants were adults aged 18–59 years who had been diagnosed with essential hypertension for at least six months [23], defined as systolic blood pressure (SBP) ≥140 mm Hg and/or diastolic blood pressure (DBP) ≥90 mm Hg, and current use of antihypertensive medication. Additional inclusion criteria included the ability to read and communicate in Chinese and the absence of severe cognitive impairment, paralysis, or advanced comorbid conditions such as end-stage renal disease.

Simple random sampling was applied among eligible clinic attendees during the data collection period. Each day, identification numbers of eligible patients were placed in an opaque container, and participants were randomly selected until the target sample size was achieved. Restricting recruitment to outpatient clinic attendees may have resulted in a sample more engaged with healthcare services, and this should be considered when interpreting the findings.

The required sample size was calculated using G*Power 3.1 for multiple linear regression analysis. Assuming a medium effect size ($f^2 = 0.15$), an alpha level of 0.05, and a statistical power of 0.90 [24], and four independent variables, a minimum of 108 participants was required.

2.3. Instruments

Validated self-report instruments were used to collect data on demographic characteristics, lifestyle modification, life stress, hypertension knowledge, self-efficacy, and family relationships. All instruments were administered with authorization from the original developers or copyright holders. Participants were instructed to respond based on their recent behavior and experience.

Lifestyle modification was assessed using the Chinese version of the Hypertension Self-Care Profile Behavior Scale, which assesses adherence to recommended health behaviors related to hypertension management. This scale was developed by Han *et al*. [25] and translated into Chinese by Ma *et al*., with a reported Cronbach's α of 0.86 [26]. It comprises 20 items rated on a 4-point scale (4 = Always, 1 = Rarely/Never); items 15 and 16 are reverse-coded. Potential total scores range from 20 to 80, with higher scores indicating better lifestyle modifications. For descriptive purposes, mean subscale scores were converted to a 1-4 grading scale to facilitate comparison across lifestyle domains.

Life stress was assessed using the Chinese version of the Perceived Stress Scale-10. The scale was developed by Cohen *et al*. [27] and translated into Chinese by Wang *et al*., with a reported Cronbach's α of 0.91 [28]. The scale includes ten items, of which six are negatively stated items and scored from 4 to 0 (4 = Very Often, 0 = Never); the four positively stated items are reverse-coded. The potential total scores range from 0 to 40, with a higher score indicating higher life stress.

Hypertension knowledge was assessed using the Chinese version of the Hypertension Knowledge-Level Scale. The scale was developed by Erkoc *et al*. [29] and translated into Chinese by You *et al*., with a Cronbach's α of 0.71 [30]. It comprises 22 items, scored 1 for each correct response and 0 for each incorrect or unknown response, yielding a potential total score ranging from 0 to 22. Scores are converted to a percentage of the total and categorized into three levels: good (≥ 80%), fair (60%-79%), and poor (< 60%) [31].

Self-efficacy was assessed using the Chinese-translated version of the Hypertension Self-Efficacy Scale, which was developed by Warren-Findlow *et al*., with a reported Cronbach's α of 0.81 [32], following forward and backward translation procedures based on the Brislin method to ensure semantic equivalence [33]. The instrument includes five items rated from 1 to 10 based on confidence level. The mean score was calculated and categorized into two levels: good (9-10 points) and poor (< 9 points) [32].

Family relationship was assessed using the Chinese version of the Brief Family Relationship Scale. The scale was developed by Fok *et al*. [16] and translated into Chinese by Huang *et al*., with a reported Cronbach's α of 0.85 [34]. It comprises 16 items rated on a 3-point scale ranging from 0 to 2 (0 = Not at all, 2 = A lot); the Conflict subscale is reverse-coded. Potential total score ranges from 0 to 32, with a higher score indicating a better family relationship.

All instruments demonstrated acceptable internal consistency and reliability in the current sample, with Cronbach's alpha coefficients ranging from 0.81 to 0.89.

2.4. Data Collection and Ethical Considerations

Data were collected between April and June 2024. After providing written informed consent, participants completed the questionnaires privately prior to their physician visit. Anonymity and confidentiality were ensured, and participants were informed of their right to withdraw at any time without adverse consequences. Questionnaires were reviewed for completeness at the time of collection, and only fully completed questionnaires were included in the analysis.

The study protocol was approved by the Institutional Review Board of Burapha University, Thailand (G-HS132/2566), and the First Affiliated Hospital of WMU, China (KY2023-247).

2.5. Data Analysis

Data were analyzed using IBM SPSS. Descriptive statistics were used to summarize participant characteristics and study variables. Pearson's correlation analysis was conducted to examine bivariate associations between independent variables and lifestyle modification.

Standard multiple regression analysis was performed to examine the association of life stress, hypertension knowledge, self-efficacy, and family relationships with lifestyle modification. Assumptions of linear regression-including normality, linearity, homoscedasticity, independence of errors, and multicollinearity-were examined and met prior to model estimation. Statistical significance was set at $p < 0.05$.

3. RESULTS

3.1. Participant Characteristics

A total of 108 adults with hypertension participated in the study. Participants ranged in age from 25 to 59 years (M = 47.2, SD = 9.1). The sample consists predominantly of middle-aged adults, with a smaller proportion of younger adults. Most participants were male, married, employed, and living with family members. Approximately three-quarters reported no comorbid condition, and the majority had been diagnosed with hypertension for less than five years. Although most participants reported measuring blood pressure (BP) at home, fewer than half had achieved controlled BP levels at the time of data collection (Table **1**).

3.2. Description of Lifestyle Modification and its Influencing Factors

Lifestyle modification scores ranged from 28 to 70 (possible range: 20-80), with a mean score of 44.04 (SD = 8.91) out of a possible 80.00. Among lifestyle domains, lower engagement was observed in stress reduction, physical activity, and healthy dietary practices, whereas higher scores were observed for nonsmoking and limiting alcohol consumption.

Table 1. Demographic and clinical characteristics of adults with hypertension (n = 108).

Characteristics	Number (n)	Percentage (%)
Age (years)	-	-
18-39 (young)	25	23.1
40-59 (middle-aged)	83	76.5
(M = 47.2, SD = 9.1, Min = 25, Max = 59)	-	-
Gender	-	-
Male	68	63.0
Female	40	37.0
Marital status	-	-
Married	101	93.5
Single	5	4.6
Divorced / widowed	2	1.9
Education	-	-
Primary school	23	21.3
Secondary school	26	24.1
High school	34	31.5
Bachelor’s degree	20	18.5
Master's degree or PhD	5	4.6
Employment status	-	-
Employed	89	82.4
Unemployed	13	12.0
Retired	6	5.6
Income adequacy	-	-
Adequacy	64	59.3
Inadequacy	44	40.7
Number of household members	-	-
None	2	1.9
1-2	40	37.0
3-4	54	50.0
≥ 5	12	11.1
(M = 2.7, SD = 1.4, Min = 0, Max = 6)	-	-
Home BP self-monitoring	-	-
Yes	95	88.0
No	13	12.0

(Table 1) contd.....

Characteristics	Number (*n*)	Percentage (%)
Comorbidity	-	-
No	82	75.9
Yes* (*n* = 36 = 100%)	26	24.1
Diabetes	12	33.3
Heart disease	6	16.7
Chronic kidney disease	3	8.3
Others (hyperlipidemia & gout)	15	41.7
Duration of hypertension diagnosis (years)	-	-
< 1	30	27.8
1-5	49	45.4
≥ 6	29	26.8
(*M* = 3.9, *SD* = 4.0, Min = 0.5, Max = 21)	-	-
Current BP classification (mm Hg)	-	-
Normal BP (SBP < 120 and DBP < 80)	5	4.6
Elevated (SBP 120-139 and/or DBP 80-89)	35	32.4
Hypertension stage 1 (SBP 140-159 and/or DBP 90-99)	45	41.7
Hypertension stage 2 (SBP 160-179 and/or DBP 100-109)	18	16.7
Hypertension stage 3 (SBP ≥ 180 and/or DBP ≥ 110)	5	4.6

Note: *Participants may have more than one comorbidity.

The mean perceived life stress score indicates a moderate level of stress among participants. Hypertension knowledge score reflects a fair level of knowledge overall, while the self-efficacy score indicates relatively low confidence in managing hypertension-related behaviors. Family relationship score suggests generally positive family functioning (Table **2**).

3.3. Association between Variables

Pearson's correlation analysis demonstrated that lifestyle modification was negatively associated with life stress and positively associated with hypertension knowledge, self-efficacy, and family relationships. Life stress was also negatively correlated with self-efficacy and family relationship, whereas self-efficacy showed a moderate positive association with family relationship (Table **3**).

3.4. Multivariate Analysis

Standard multiple regression analysis was conducted to examine the association between the four independent variables and lifestyle modification. The overall model explained 43.1% of the variance in lifestyle modification scores (adjusted R^2 = 0.431).

Table 2. Descriptive statistics of study variables (*n* = 108).

Variables	Range		*M*		*SD*
	Potential Score	Actual Score	-		-
Lifestyle modifications	20-80	28-70	44.04	(2.20*)	8.91
Physical activity	1-4	1-4	1.81	(1.81*)	0.84
Healthy diet	10-40	11-33	18.88	(1.90*)	4.45
Limiting alcohol consumption	1-4	1-4	2.97	(2.97*)	1.16
Nonsmoking	1-4	1-4	3.31	(3.31*)	1.20
Weight control	1-4	1-4	2.40	(2.40*)	0.99
Stress reduction	2-8	2-8	3.18	(1.60*)	1.24
Disease management	4-16	6-16	11.49	(2.90*)	2.66
Life stress	0-40	2-25	14.21	-	5.50
Hypertension knowledge	0-22	10-21	16.04	(72.9%**)	2.80
Self-efficacy	1-10	3.8-10	6.92	-	1.55
Family relationship	0-32	13-32	24.84	-	4.13

Note: *The mean score was converted to a 1-4 grading scale.
**The mean score was converted to a percentage of the total possible score.

Table 3. Pearson correlation matrix of lifestyle modification and related psychosocial and cognitive variables among adults with hypertension (*n* = 108).

-	Life Stress	Hypertension Knowledge	Self-efficacy	Family Relationship	Lifestyle Modification
Life stress	1.00	-	-	-	-
Hypertension knowledge	-0.09	1.00	-	-	-
Self-efficacy	-0.37**	0.15	1.00	-	-
Family relationship	-0.41**	0.13	0.31**	1.00	-
Lifestyle modifications	-0.46**	0.26**	0.60**	0.35**	1.00

Note: **$p < 0.01$.

Table 4. Multiple regression analysis of factors associated with lifestyle modification among adults with hypertension (*n* = 108).

Independent Variables	*B*	*SE*	*β*	*t*	*p*-value
Life stress	-0.383	0.135	-0.237	-2.850	0.005
Hypertension knowledge	0.499	0.235	0.157	2.122	0.036
Self-efficacy	0.523	0.092	0.457	5.682	< 0.001
Family relationship	0.193	0.176	0.090	1.098	0.275
Constant = 18.583, $p < 0.01$, $R^2 = 0.452$, $R^2_{(adj)} = 0.431$, $F_{(4,103)} = 21.232$					

Higher levels of perceived life stress were significantly associated with lower lifestyle modification scores. In contrast, greater hypertension knowledge and higher self-efficacy were significantly associated with better lifestyle modification. Family relationship was not significantly associated with lifestyle modification after controlling for other variables in the model (Table **4**).

4. DISCUSSION

This study examined lifestyle modification and its associated psychosocial and cognitive factors among Chinese adults with hypertension, guided by the Individual and Family Self-Management Theory. Overall, lifestyle modification was suboptimal, particularly in domains requiring sustained behavioral and emotional regulation, such as stress reduction, physical activity, and healthy dietary practices. These findings are consistent with previous research indicating that working-age adults with hypertension face substantial challenges in maintaining the recommended lifestyle behavior [35, 36].

The working-age adults may suffer from high stress, as they are the main members of the workforce and the source of economic support for the family. They may generally perceive hypertension as having limited health consequences, and this attitude can hinder lifestyle modification [8, 37]. Most participants were male, middle-aged, married, employed, and living with multiple family members; however, nearly half reported insufficient income. Previous studies have suggested that individuals with these characteristics tend to pay less attention to their health, and that time constraints increase the likelihood of fast-food consumption and irregular health management [38-40]. In addition, most participants were classified as having stage 1 hypertension, with a short disease duration and no comorbidity, which may further reduce adherence to lifestyle modification [41].

From an IFSMT perspective, contextual and self-management process factors may interact to shape an individual's engagement in lifestyle modification. The findings from the present study suggest that lifestyle modification is associated not only with knowledge but also with an individual's perceived capacity to translate that knowledge into action under conditions of stress.

Perceived life stress was negatively associated with lifestyle modification, supporting prior evidence that stress may undermine an individual's self-regulatory resources and reduce engagement in health-promoting behaviors [10]. Related evidence suggests that during stressful periods, individuals tend to avoid physical activity, whereas those with stronger stress-coping ability generally perform better in lifestyle modification [42]. In the current sample, most participants were middle-aged, employed, and managing multiple social and family responsibilities, and that may contribute to elevated stress levels. Within nursing practice, these findings highlight the importance of routine stress assessment and the integration of brief stress-management strategies into outpatient care [43]. Although causal inference cannot be drawn, addressing perceived stress may represent a feasible entry point for supporting lifestyle modification in this population.

Hypertension knowledge was positively associated with lifestyle modification, which aligns with a previous study [11]. Based on IFSMT, adequate knowledge may enhance an individual's understanding of the rationale for lifestyle modification and support informed decision-making. This suggests that individuals who lack accurate and specific knowledge about healthy lifestyles are more likely to show poor treatment adherence, limited self-management awareness, and reduced motivation to modify their lifestyle. In addition, nearly half the sample had relatively low educational attainment, which may have

influenced their acquisition and understanding of hypertension knowledge [12]. However, knowledge alone is unlikely to be sufficient for sustained behavior modification. From a nursing perspective, educational interventions may be most effective when they are tailored to a patient's educational background and delivered alongside practical strategies that facilitate behavior implementation in daily life [44].

Self-efficacy demonstrated the strongest association with lifestyle modification in the multivariable model, consistent with prior research [13]. This finding aligns with IFSMT, which emphasizes self-efficacy as a central self-management process influencing health behavior. Individuals with higher confidence in their ability to manage hypertension may be more likely to initiate and maintain lifestyle modification despite competing demands. Nursing strategies such as motivational interviewing, collaborative goal-setting, and positive reinforcement may help strengthen self-efficacy and support gradual behavior change [45]. Such approaches may help patients translate abstract recommendations into personally meaningful goals, thereby enhancing autonomy, supporting gradual confidence building and skill acquisition through experience, and ultimately promoting the maintenance of a healthy lifestyle.

Although family relationships were positively correlated with lifestyle modification, it was not independently associated with lifestyle modification in the regression analysis. That finding is somewhat inconsistent with previous research [17]. One possible explanation is that a good family relationship often appears as a prerequisite for strong family support, which can directly improve lifestyle modification [14, 19]. Another possible explanation is that family relationships may exert an indirect effect through other variables, such as stress reduction or self-efficacy, rather than functioning as a direct effect. This interpretation is consistent with IFSMT, which conceptualizes family factors as social facilitation processes that interact with individual factors. Consistent with this interpretation, family relationships were significantly associated with life stress and self-efficacy, suggesting that it could be indirectly associated with lifestyle modification. This is plausible because stable and secure family relationships can enhance a family member's ability or willingness to adopt a healthier lifestyle [18]. This pattern may also reflect subjective reporting bias: Participants may have embellished their response on the conflict subscale, which might indicate a relatively low level of family conflict. In traditional Chinese culture, cultural norms emphasizing family harmony may also influence self-reported family relationships and obscure variability in perceived conflict [46].

Together, these findings contribute to the nursing literature by identifying psychosocial and cognitive factors associated with lifestyle modification among adults with hypertension. The results underscore the need for nursing interventions that move beyond information provision to address stress and self-efficacy as integral components of lifestyle modification support. Longitudinal and interventional studies are warranted to clarify causal pathways and to examine whether targeting these factors leads to sustained improvements in lifestyle modification.

5. LIMITATIONS

This study has several limitations that should be acknowledged. First, participants were recruited from a single tertiary hospital, and that fact may limit the generalizability of the findings to adults with hypertension in other regions or healthcare settings. Future studies employing multicenter or community-based sampling are warranted to enhance external validity.

Second, all variables were assessed using self-reported data collection instruments, and the response may be subject to recall bias and social desirability bias, particularly given that data were collected in a clinical setting before physician consultation.

Third, the cross-sectional design precludes conclusions regarding temporal sequence or causality among the study variables. Accordingly, the observed associations should therefore be interpreted with caution. Longitudinal and interventional studies are needed to clarify causal pathways and to examine whether modifying psychosocial and cognitive factors leads to sustained improvements in lifestyle modification.

Finally, although family relationships were included based on the IFSMT, it was not independently associated with lifestyle modification in the multivariable model. Future research should explore whether family relationships operate through indirect pathways, such as mediating or moderating effects *via* stress or self-efficacy.

CONCLUSION

This study provides evidence that lifestyle modification among adults with hypertension remains suboptimal and is significantly associated with psychosocial and cognitive factors, including perceived life stress, hypertension-related knowledge, and self-efficacy. Guided by the IFSMT, these findings highlight potential areas for nursing assessment and patient support rather than causal targets for intervention.

From a nursing perspective, routine assessment of stress, tailored education focused on hypertension self-management, and strategies to enhance self-efficacy-such as collaborative goal setting and motivational interviewing-may be valuable components of comprehensive hypertension care. However, given the cross-sectional design and the single-site sample, these implications should be interpreted cautiously. Future longitudinal and intervention studies are needed to evaluate whether addressing these factors results in sustained lifestyle modification and improved hypertension outcomes.

AUTHORS' CONTRIBUTIONS

The authors confirm contribution to the paper as follows: Study conception and design: G.W.; S.N; M.K. Data collection: G.W. Data analysis and interpretation of results: G.W; S.N. Writing - draft the initial manuscript: G.W. Writing – review, revised and edited: S.N. All authors reviewed the results and approved the final version of the manuscript.

LIST OF ABBREVIATIONS

CVD	=	Cardiovascular Disease
IFSMT	=	Individual and Family Self-Management Theory
SM	=	Self-management
WMU	=	Wenzhou Medical University
SBP	=	Systolic Blood Pressure
DBP	=	Diastolic Blood Pressure
BP	=	Blood Pressure

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was approved by the Institutional Review Board of Burapha University, Thailand (G-HS132/2566), and the First Affiliated Hospital of Wenzhou Medical University, China (KY2023-247).

HUMANS AND ANIMAL RIGHTS

All human research procedures followed were in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013.

CONSENT FOR PUBLICATION

All participants signed informed consent.

STANDARDS OF REPORTING

STROBE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

The datasets generated and analyzed during this study could be obtained from the first [J.G] and corresponding author [N.S] upon reasonable request.

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None.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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