

ASSOCIATION BETWEEN COPING MECHANISMS AND ADAPTIVE MODES IN ADULTS WITH HYPERTENSION: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Hypertension is a chronic condition requiring continuous adaptation to physiological and psychosocial changes. Within the Roy Adaptation Model, coping mechanisms are considered essential regulators of adaptive responses. However, evidence regarding the relationship between coping mechanisms and adaptive modes among adults with hypertension remains limited.

Objective: To examine the association between coping mechanisms and adaptive modes among adults with hypertension.

Methods: A cross-sectional study was conducted among 150 adults with hypertension attending primary healthcare centers in Surabaya, Indonesia. Coping mechanisms and adaptive modes were assessed using researcher-adapted questionnaires based on the Roy Adaptation Model. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM).

Results: The participants had a mean age of 59.44 ± 11.12 years, and the mean duration of hypertension was 4.92 ± 5.26 years. More than half of the participants demonstrated high coping mechanisms (53.3%), while 90.0% exhibited high adaptive modes. Coping mechanisms were positively associated with adaptive modes ($\beta = 0.492$, $p < 0.001$), indicating that higher levels of coping mechanisms were associated with better adaptive modes.

Conclusions: Coping mechanisms were significantly associated with adaptive modes among adults with hypertension. These findings support the application of the Roy Adaptation Model in hypertension care and highlight the importance

of nursing interventions that strengthen adaptive coping strategies to promote patients' adaptive responses.

Keywords: *Hypertension; coping mechanisms; adaptive modes; Roy Adaptation Model; cross-sectional study.*

INTRODUCTION

Hypertension is a major global public health challenge, affecting approximately 1.4 billion adults aged 30–79 years, with two-thirds living in low- and middle-income countries (LMICs) (Njoloma et al., 2021; Sidney & Taubert, 2025). Despite the availability of effective treatments, only about one in five people with hypertension achieve adequate blood pressure control, with the proportion being as low as 10% in some LMICs (The Lancet Neurology, 2023). This persistent burden is further compounded by limited awareness, diagnosis, and access to appropriate healthcare, resulting in substantial numbers of individuals remaining inadequately treated (Liu & Lu, 2024). Beyond its clinical consequences, uncontrolled hypertension contributes to considerable economic costs through increased healthcare utilization and productivity losses associated with complications such as cardiovascular disease and stroke (CH et al., 2025; The Lancet Neurology, 2023). Consequently, effective hypertension management requires integrated strategies that extend beyond pharmacological treatment to address behavioral risk factors, patient self-management, and healthcare system capacity (Sidney & Taubert, 2025).

For individuals living with hypertension, long-term disease management requires continuous adjustment to treatment demands and lifestyle changes. Patients may experience physical and psychosocial challenges, including disruptions to daily activities, anxiety about potential complications, and difficulties sustaining recommended health behaviors (Mehta et al., 2025). Lifestyle modifications, such as dietary changes and regular physical activity, may become particularly challenging when accompanied by limited social support and barriers within the healthcare system (Elmakki, 2025). Psychosocial stressors, including time constraints and limited opportunities for relaxation, may further complicate patients' ability to manage their condition effectively (Abadi et al., 2020). Medication adherence, another essential component of hypertension management, can also be affected by factors such as health literacy and negative experiences with healthcare services, particularly among marginalized populations (Mugisha, 2024). These challenges indicate that living with hypertension involves not only managing physiological changes but also adapting cognitively, emotionally, socially, and behaviorally to the demands of a chronic condition (Liu & Lu, 2024; Mugisha, 2024).

In this context, coping mechanisms are particularly important because they represent the ways in which individuals respond to and manage the demands associated with chronic illness. Patients with hypertension may employ cognitive, emotional, social, and behavioral strategies to deal with treatment demands, stress, and lifestyle changes. A phenomenological study in Southern Ethiopia, for example, found that patients experienced substantial challenges related to stress and treatment adherence and emphasized the importance of family support and access to healthcare in their coping processes (Endrias et al., 2024). Similarly, illness perception has been shown to influence self-regulatory fatigue and coping styles among older adults, suggesting that strengthening self-efficacy and addressing negative perceptions of illness may facilitate more effective coping (Lu et al., 2025). Treatment preferences may also influence how patients engage with long-term management, particularly when treatment regimens involve concerns about side effects and convenience, highlighting the importance of shared decision-making in supporting patient engagement (Xu et al., 2022). Furthermore, coping flexibility has been associated with a lower risk of disease, suggesting that the ability to adapt coping responses to changing circumstances may have important implications for health outcomes (S. Zhang et al., 2023). Collectively, these findings suggest that coping is an important component of how individuals respond to the ongoing demands of hypertension.

The importance of coping becomes particularly relevant when hypertension is viewed from the perspective of adaptation. The Roy Adaptation Model (RAM) conceptualizes individuals as adaptive systems who continuously respond to environmental stimuli through coping processes. Within this framework, coping mechanisms constitute central processes through which individuals respond to internal and external stimuli, while the resulting responses are manifested across four adaptive modes: physiological, self-concept, role function, and interdependence. These modes provide a multidimensional representation of how individuals adapt to changes and health-related demands (Callis, 2020). Thus, from a RAM perspective, coping mechanisms are not merely strategies for managing stress but are processes that may influence how individuals achieve adaptive responses across multiple dimensions of functioning.

Although previous research has examined coping among adults with hypertension, the relationship between coping mechanisms and adaptation has received comparatively limited empirical attention within the RAM framework. Existing studies have primarily focused on outcomes such as resilience, illness adjustment, treatment adherence, or disease-related self-management. For instance, a cross-sectional study among patients with hypertension in Ghana found that coping strategies were positively associated with personal and relational resilience, underscoring the importance of coping in managing the

demands of chronic hypertension (Boima et al., 2023). Meanwhile, the RAM has been applied to explain adaptation in individuals with chronic illnesses by linking coping processes with responses across physiological, self-concept, role function, and interdependence domains (X. Wang et al., 2020). However, despite this theoretical linkage, limited empirical evidence has specifically examined whether coping mechanisms are associated with adaptive modes among adults living with hypertension.

Addressing this gap is important for strengthening the empirical application of the RAM in chronic hypertension care. Specifically, clarifying the association between coping mechanisms and adaptive modes may provide empirical support for the theoretical proposition that coping processes contribute to adaptive responses across multiple domains of functioning. Such evidence may also inform the development of theory-based nursing approaches that strengthen patients' adaptive capacity in managing the long-term demands of hypertension. This is particularly relevant given recent evidence that nurse-led and stress-management interventions can improve hypertension-related outcomes (Webster et al., 2025).

Therefore, this study aimed to examine the association between coping mechanisms and adaptive modes among adults with hypertension. By investigating this relationship within the framework of the Roy Adaptation Model, the study seeks to provide empirical evidence that may strengthen the theoretical basis for nursing approaches aimed at supporting adaptation in chronic hypertension care.

METHODS

A cross-sectional study was conducted to examine the association between coping mechanisms and adaptive modes among adults with hypertension. The study was conducted in primary healthcare settings in Surabaya, Indonesia, from November 2025 to January 2026. A total of 150 adults with hypertension participated in the study. Participants were eligible if they were adults diagnosed with hypertension and met the predetermined inclusion criteria, while those unable to complete the study questionnaire were excluded. Data were collected using structured questionnaires after participants provided informed consent.

Coping mechanisms and adaptive modes were operationalized using researcher-adapted questionnaires based on the Roy Adaptation Model (RAM). Coping mechanisms were measured using two observed indicators, while adaptive modes were measured using four observed indicators representing the conceptual dimensions of adaptation within the Roy framework. The

measurement properties of both constructs were assessed before examining their structural association.

Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS. PLS-SEM was selected because the study examined the association between latent constructs measured by multiple observed indicators. The analysis involved assessment of the measurement and structural models. The measurement model was evaluated using outer loadings, average variance extracted (AVE), composite reliability, and the Fornell–Larcker criterion to assess indicator reliability, convergent validity, internal consistency, and discriminant validity, respectively. The structural model was evaluated using the path coefficient (β), t-statistic, and p-value obtained through bootstrapping. The explanatory capacity of the model was assessed using R^2 , while f^2 was used to determine effect size and Q^2 to assess predictive relevance. Statistical significance was determined at $p < 0.05$.

Ethical approval was obtained from the Health Research Ethics Committee (KEPK), Poltekkes Kemenkes Surabaya, with approval number No. EA/4161/KEPK-Poltekkes_Sby/V/2026. All participants provided informed consent before participating in the study. Participation was voluntary, and the confidentiality and anonymity of participants were maintained throughout the research process.

RESULTS

Participant Characteristics

A total of 150 adults with hypertension participated in the study. The mean age of participants was 59.44 years ($SD = 11.118$), with ages ranging from 27 to 85 years, while the mean duration of hypertension was 4.92 years ($SD = 5.264$; range 1–30 years).

Table 1. Characteristics of Participants (n = 150)

Characteristics	n	%
Sex		
Male	29	19.3
Female	121	80.7
Education		
No formal education	5	3.3
Elementary school	73	48.7
Junior high school	27	18.0
Senior high school	39	26.0
Higher education	6	4.0
Occupation		
Working/business	45	30.0

Not working/housewife/retired	105	70.0
Living arrangement		
With family	138	92.0
Alone	12	8.0
Medication use		
No	34	22.7
Yes	116	77.3
Medication adherence		
No	46	30.7
Yes	104	69.3
Regular exercise		
No	70	46.7
Yes	80	53.3
Low-salt diet		
No	40	26.7
Yes	110	73.3
History of complications		
No	109	72.7
Yes	41	27.3
Family support		
No	5	3.3
Yes	145	96.7
Previous hospitalization due to hypertension		
No	125	83.3
Yes	25	16.7
Family history of hypertension		
No	79	52.7
Yes	71	47.3

Most participants were women (80.7%), had elementary school education (48.7%), and were not employed, homemakers, or retired (70.0%). The majority lived with family members (92.0%), were taking antihypertensive medication (77.3%), and reported medication adherence (69.3%). More than half reported regular exercise (53.3%) and adherence to a low-salt diet (73.3%). Most participants had no history of complications (72.7%) or hospitalization due to hypertension (83.3%), while 96.7% reported receiving family support.

1.1. Levels of Coping Mechanisms and Adaptive Modes

Table 2. Distribution of Coping Mechanisms and Adaptive Modes

Variable	Category	n	%
Coping mechanisms	Low	13	8.7
	Moderate	57	38.0
	High	80	53.3
Adaptive modes	Low	1	0.7

	Moderate	14	9.3
	High	135	90.0

The majority of participants demonstrated high levels of coping mechanisms and adaptive modes. High coping mechanisms were observed in 80 participants (53.3%), moderate in 57 (38.0%), and low in 13 (8.7%). Similarly, 135 participants (90.0%) demonstrated high adaptive modes, while 14 (9.3%) showed moderate adaptive modes and only 1 participant (0.7%) showed a low level.

Measurement Model

Table 3. Measurement Model Assessment

Construct	Indicator loading	AVE	Composite reliability
Coping Mechanisms	0.737–0.920	0.695	0.818
Adaptive Modes	0.761–0.874	0.689	0.898

The measurement model demonstrated satisfactory indicator reliability and convergent validity for both study constructs. Indicator loadings ranged from 0.737 to 0.920 for coping mechanisms and from 0.761 to 0.874 for adaptive modes. The AVE values were 0.695 for coping mechanisms and 0.689 for adaptive modes, exceeding the recommended threshold of 0.50. Composite reliability values were 0.818 and 0.898, respectively, indicating satisfactory internal consistency.

Discriminant validity

	Coping Mechanisms	Adaptive Modes
Coping Mechanisms	0.833	0.492
Adaptive Modes	0.492	0.830

Discriminant validity was also supported, as the square root of the AVE for coping mechanisms (0.833) and adaptive modes (0.830) exceeded the correlation between the two constructs (0.492).

1.2. Association Between Coping Mechanisms and Adaptive Modes

Coping mechanisms were positively associated with adaptive modes ($\beta = 0.492$, $t = 4.132$, $p < 0.001$), with a moderate effect size ($f^2 = 0.319$). The model

explained 24.2% of the variance in adaptive modes ($R^2 = 0.242$) and demonstrated predictive relevance ($Q^2 = 0.156$).

Relationship	β	t	p	f^2
Coping Mechanisms → Adaptive Modes	0.492	4.132	<0.001	0.319

R^2 Adaptive Modes = **0.242**

Q^2 Adaptive Modes = **0.156**

The structural model showed a positive and statistically significant association between coping mechanisms and adaptive modes among adults with hypertension ($\beta = 0.492$, $t = 4.132$, $p < 0.001$). The effect size was 0.319, indicating a meaningful contribution of coping mechanisms to the explained variance in adaptive modes. Coping mechanisms accounted for 24.2% of the variance in adaptive modes ($R^2 = 0.242$), while the Q^2 value of 0.156 indicated the model's predictive relevance.

DISCUSSION

The present study demonstrated a significant positive association between coping mechanisms and adaptive modes among adults with hypertension. The PLS-SEM analysis showed a path coefficient of 0.492 ($p < 0.001$), indicating that higher levels of coping mechanisms were associated with better adaptive modes. The effect size ($f^2 = 0.319$) indicated a moderate contribution of coping mechanisms to adaptive modes. These findings suggest that coping mechanisms are an important component of the way adults with hypertension respond to the continuing demands associated with living with a chronic condition. Hypertension requires sustained adjustment to medication use, dietary modification, physical activity, health monitoring, and other treatment-related demands, making adaptation an ongoing rather than an isolated process (Rosén et al., 2022; Salman & Cohen, 2021).

The observed association is consistent with the Roy Adaptation Model (RAM), which conceptualizes individuals as adaptive systems who respond to environmental stimuli through coping processes. Within this framework, coping mechanisms facilitate the processing of stimuli and contribute to adaptive responses expressed through the adaptive modes. The significant relationship identified in this study therefore provides empirical support for the theoretical proposition that coping mechanisms are associated with the adaptation process among adults with hypertension. Previous research applying RAM to hypertension has similarly demonstrated the relevance of theory-based

nursing interventions in reducing maladaptive responses and supporting patients' adaptation to their condition (Yoldaş et al., 2019; J. Zhang et al., 2021). However, the present study contributes by specifically examining the empirical association between coping mechanisms and adaptive modes rather than focusing solely on clinical or behavioral outcomes.

The relationship between coping and adaptation can also be understood in the context of the psychological demands of living with hypertension. Adults with hypertension may experience persistent concerns related to disease management, treatment adherence, lifestyle modification, and the possibility of complications. Psychological problems, including anxiety and depression, have been reported among people with hypertension and may adversely affect health-related quality of life (Alwhaibi & Balkhi, 2025). In this context, effective coping may help individuals manage stressors associated with chronic illness and maintain more adaptive responses. Previous evidence also suggests that adaptive coping can reduce the negative consequences of perceived stress, while resilience may provide additional protection against psychological distress among people with hypertension (Pageau et al., 2024; M. Wang et al., 2023). Thus, the present finding supports the view that coping and adaptation should be considered together when addressing the multidimensional needs of adults with hypertension.

The findings have important implications for nursing practice. Rather than focusing exclusively on blood pressure control, nurses can assess how patients cope with the demands of long-term hypertension management and identify areas in which coping may be less effective. Nursing interventions may subsequently incorporate individualized education, counseling, problem-solving, and support for self-management behaviors. Nurse-led interventions have demonstrated potential to improve hypertension management by strengthening patients' knowledge, self-efficacy, and engagement in treatment and lifestyle modification (Bulto et al., 2023; Ibrahim et al., 2024). From the RAM perspective, such interventions can be directed toward strengthening patients' coping processes and supporting more adaptive responses to the stimuli associated with chronic hypertension. Family and community support may further complement these efforts, particularly among older adults who may face additional challenges in long-term disease management (Li et al., 2026).

The present findings also have a theoretical implication for the application of the Roy Adaptation Model in hypertension care. Although coping has been widely studied in relation to psychological well-being and chronic disease management, this study directly examined its association with adaptive modes as conceptualized within the Roy framework. The moderate association observed between coping mechanisms and adaptive modes suggests that coping

represents a meaningful component of adaptation, while also indicating that other factors contribute to adaptive responses. This interpretation is consistent with the RAM perspective, in which adaptation results from the interaction between coping processes and multiple environmental and individual factors rather than from a single determinant (Mustață, 2021; Theodoratou & Argyrides, 2024). The findings therefore provide a basis for further research examining whether interventions designed to strengthen coping mechanisms can improve adaptive modes in adults with hypertension.

Several limitations should be considered. First, the cross-sectional design prevents conclusions regarding causality. Although higher coping mechanisms were significantly associated with better adaptive modes, the direction of this relationship cannot be established. Second, the participants were recruited from primary healthcare settings in Surabaya, Indonesia, which may limit the generalizability of the findings to other populations and healthcare contexts. In addition, the study examined the association between the two constructs without assessing changes in coping or adaptation over time. Future longitudinal and intervention studies are therefore needed to determine whether strengthening coping mechanisms leads to sustained improvements in adaptive modes and to clarify the temporal relationship between these constructs.

CONCLUSION

The findings of this study demonstrate a positive and statistically significant association between coping mechanisms and adaptive modes among adults with hypertension. Coping mechanisms showed a moderate contribution to adaptive modes, indicating that coping is an important component of the adaptation process in adults living with hypertension.

From the perspective of the Roy Adaptation Model, these findings support the relevance of coping mechanisms in understanding adaptive responses to the demands of chronic hypertension. The findings also suggest that nursing care should consider coping mechanisms when assessing and supporting adaptation among adults with hypertension. However, because of the cross-sectional design, the findings indicate an association rather than a causal relationship. Future longitudinal and intervention studies are needed to determine whether strengthening coping mechanisms can improve adaptive modes over time.

ETHICS STATEMENT

This study was conducted in accordance with ethical principles for research involving human participants and received ethical approval from the Health Research Ethics Committee (KEPK), Poltekkes Kemenkes Surabaya, with approval number No. EA/4161/KEPK-Poltekkes_Sby/V/2026. All participants

provided informed consent prior to participation. Participation was voluntary, and the confidentiality and anonymity of participants were maintained throughout the study.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest related to this study.

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