Determinants of self-care and psychosocial readiness among hypertensive patients: Implications for nursing in low-resource settings

Ni Putu Ayu Ratna Dewi, M.Kep[1,2], Nursalam, PhD[1], Ni Luh Putu Inca Buntari Agustini, PhD[2], Ni Wayan Sri Wahyuni, M.Kep[3], Komang Ardidhana Nugraha Putra, M.Kep[2]

[1]Faculty of Nursing, Universitas Airlangga, Surabaya, Indonesia, [2]Faculty of Health, Institute of Technology and Health Bali, Denpasar, Indonesia, [3]Faculty of Health, Universitas Triatma Mulya, Denpasar, Indonesia

ABSTRACT

Introduction: Self-care behaviour, motivation, and self-efficacy represent related but distinct dimensions of hypertension self-management. Previous Indonesian studies have generally examined self-care behaviour as the primary outcome or treated motivation and self-efficacy as its explanatory factors. Evidence describing the outcome-specific associations of sociodemographic and clinical characteristics with these three domains remains limited. This study examined the associations of selected sociodemographic and clinical characteristics with self-care behaviour, motivation, and self-efficacy among adults with hypertension.

Materials and Methods: This analytical cross-sectional study included 120 adults with hypertension attending the Gianyar 1 Community Health Centre, Bali, Indonesia, between August and September 2024. Participants were selected from an eligible patient registry using simple random sampling. Self-care behaviour, motivation, and self-efficacy were measured using the validated Indonesian version of the High Blood Pressure Self-Care Profile. Bivariate comparisons were followed by three separate multiple linear regression models.

Results: The mean scores were 44.09 (95% confidence interval [CI] 42.44–45.74) for self-care behaviour, 44.64 (95% CI 42.56–46.72) for motivation, and 42.99 (95% CI 41.21–44.78) for self-efficacy. The self-care behaviour model was statistically significant (R^2=0.375; adjusted R^2=0.304; p<0.001). Higher self-care behaviour scores were observed among participants aged 41–50 years and private-sector employees, whereas lower scores were observed among participants with no formal schooling, junior high school education, and a hypertension duration of 1–5 years. The motivation model was also statistically significant but had lower explanatory value (R^2=0.186; adjusted R^2=0.094; p=0.028). Participants aged 41–50 years had higher motivation scores, whereas those with junior high school education had lower scores. The overall self-efficacy model was not statistically significant.

Conclusion: Associations were observed mainly for self-care behaviour and motivation, whereas the examined characteristics did not collectively explain self-efficacy. These findings support individualised assessment of behavioural, motivational, and confidence-related needs in primary care. Causal relationships cannot be inferred from this cross-sectional study.

KEYWORDS:
Hypertension; self care; self efficacy; motivation; self-management; primary health care; Indonesia

INTRODUCTION

Hypertension remains a major global health challenge and an important cause of preventable cardiovascular, cerebrovascular, and renal morbidity.[1] The burden has increasingly shifted towards low- and middle-income countries, where limitations in diagnosis, continuity of care, and long-term disease management continue to impede hypertension control.[2] In Indonesia, the prevalence of hypertension increased from 25.8% in 2013 to 34.1% in 2018 and was estimated at 30.8% in 2023.[3] Bali also carries a substantial burden, with 562,519 cases reported in 2022.[4] Although national programmes have expanded chronic disease services, effective control ultimately requires patients to perform recommended activities consistently outside healthcare encounters. These activities include taking medication as prescribed, reducing dietary sodium, engaging in regular physical activity, monitoring blood pressure, managing stress, and avoiding tobacco and excessive alcohol consumption.[5,6]

Hypertension self-management involves more than the performance of recommended behaviours. The High Blood Pressure Self-Care Profile distinguishes three related but conceptually different domains: self-care behaviour, motivation, and self-efficacy.[7,8] Self-care behaviour represents the extent to which recommended activities are performed. Motivation reflects the importance attributed to those activities and the willingness to maintain them, whereas self-efficacy represents confidence in one's ability to perform self-care under different circumstances.[9] For the purposes of this study, motivation and self-efficacy were treated as psychosocial dimensions of readiness for hypertension self-management. Examining these domains separately is clinically relevant because patients may recognise the importance of self-care but lack confidence in performing it, or may express confidence without consistently translating that confidence into behaviour.[10]

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Corresponding Author: Ni Putu Ayu Ratna Dewi
Email: ayuratna622@gmail.com

This study was conceptually informed by the Health Belief Model. The model proposes that engagement in health-related action is shaped by perceived susceptibility to a health threat, perceived severity of its consequences, perceived benefits of the recommended action, perceived barriers to performing it, cues to action, and self-efficacy.[11,12] Applied to hypertension, patients may be more willing to undertake self-care when they recognise their vulnerability to complications, understand the seriousness of uncontrolled blood pressure, perceive self-care as beneficial, consider its barriers manageable, receive appropriate prompts, and feel capable of performing the required activities. Motivation was not treated as a separate construct within the Health Belief Model. Instead, it was interpreted as a proximal state of readiness that may arise from patients' appraisal of health threats, expected benefits, perceived barriers, and cues to action. Because the present study did not directly measure all Health Belief Model constructs, the model was used to guide the selection of variables and interpretation of the relationships rather than to test the complete theoretical pathway. Recent studies have demonstrated the relevance of these beliefs to hypertension care, salt-reduction practices, lifestyle modification, and continuity of chronic disease care.[11–13]

Within this framework, age, sex, educational attainment, employment status, and duration of hypertension were considered personal and contextual modifying factors. Educational attainment may influence the interpretation of health information and understanding of the benefits of self-care, whereas employment may affect financial resources, daily routines, and perceived barriers.[14] Duration of hypertension may reflect accumulated experience with treatment, repeated exposure to health information, and previous opportunities to practise self-management.[2] Age and sex may also be associated with differences in functional capacity, social roles, perceived vulnerability, and healthcare experience.[15-16]

Previous Indonesian studies have contributed important evidence on hypertension self-care, but their analytical focus has differed from that of the present study. Sarfika et al. examined self-care behaviour according to participant characteristics but did not analyse motivation and self-efficacy as parallel outcomes.[14] More recently, Upoyo et al. measured self-care behaviour, motivation, and self-efficacy, but treated motivation and self-efficacy primarily as explanatory factors for self-care behaviour.[17] Consequently, it remains unclear whether sociodemographic and clinical characteristics demonstrate similar or distinct associations with behavioural performance, motivation, and self-efficacy when the three domains are treated as parallel continuous outcomes using the same validated instrument and predictor set.

Therefore, this study aimed to examine the associations of age, sex, educational attainment, employment status, and duration of hypertension with continuous self-care behaviour, motivation, and self-efficacy scores among adults receiving hypertension care at a community health centre in Bali, Indonesia. We hypothesised that these sociodemographic and clinical characteristics would be independently associated with the three outcomes, with outcome-specific patterns of association across the domains. The contribution of the present study therefore extends beyond providing evidence from a different geographical setting by examining three complementary domains of hypertension self-management as parallel continuous outcomes using the same instrument and predictor set.

MATERIALS AND METHODS

2.1 Design and Setting

An analytical cross-sectional study was conducted between August and September 2024 at the Gianyar 1 Community Health Centre in Bali, Indonesia. The study examined sociodemographic and clinical factors associated with self-care behaviour, motivation, and self-efficacy among adults with hypertension. The study was reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology guidelines for cross-sectional studies.

2.2 Sample and Participants

Following eligibility screening, 189 patients with hypertension met the predefined eligibility criteria and constituted the sampling frame in June 2024.

The target sample size was initially estimated from the finite eligible population using the formula $n=N/[1+N(e^2)]$, commonly referred to as the Slovin formula, with a 5% margin of error. With 189 eligible patients, the calculation yielded 128.35; an operational target of approximately 128 participants was established during the original study planning. This finite-population approach was selected because participants were to be randomly selected from a complete and finite patient registry.

Because this formula does not incorporate the anticipated effect size or the number of regression parameters, a sensitivity analysis was subsequently conducted for the achieved sample in accordance with contemporary recommendations for multiple regression sample-size assessment.[18] With 120 participants, 12 predictor parameters, a two-sided significance level of 0.05, and 80% power, the minimum detectable overall effect was Cohen's $f^2=0.159$, equivalent to an R^2 of approximately 0.137. The achieved sample was therefore capable of detecting approximately moderate overall regression effects, although smaller associations may not have been identified.

A total of 128 patients were selected from the eligible sampling frame using a computer-generated random-number list. Eight selected patients could not be contacted and therefore did not participate. Among the 120 patients who were successfully contacted, none declined participation. All 120 completed the study assessments and were included in the analysis, corresponding to a response rate of 93.8%.

Participants were eligible if they: (1) were older than 40 years; (2) had been diagnosed with primary hypertension for at least 12 months before recruitment; (3) were receiving antihypertensive treatment; and (4) were able to communicate in Indonesian or Balinese. Patients were excluded if they had severe hypertension at recruitment,

defined as systolic blood pressure ≥180 mmHg and/or diastolic blood pressure ≥120 mmHg, or a severe medical condition that prevented participation or questionnaire completion, including end-stage renal disease, active malignancy, or decompensated heart failure.

2.3 Instruments

Data were collected using a demographic questionnaire and the Indonesian version of the High Blood Pressure Self-Care Profile.

1. The demographic questionnaire recorded age, sex, religion, educational attainment, employment status, and duration of hypertension.
2. The High Blood Pressure Self-Care Profile comprises three 20-item subscales measuring self-care behaviour, motivation, and self-efficacy.[7-8] Each item is scored on a four-point Likert scale ranging from 1 to 4. Item scores within each subscale are summed to produce a total score ranging from 20 to 80, with higher scores indicating better self-care behaviour, higher motivation, or greater self-efficacy. The Indonesian version has demonstrated satisfactory validity and internal consistency, with Cronbach's alpha coefficients exceeding 0.70 for the three subscales.[8]

The continuous total score for each subscale was used as the primary outcome in all bivariate and multivariable analyses. For supplementary descriptive presentation only, scores were classified as poor (<40), moderate (40–59), or good (≥60). These cut-off values were not established as validated clinical thresholds by either the original instrument developers or the Indonesian validation study. Therefore, the categories were used solely to describe the distribution of scores and were not used in hypothesis testing, variable selection, or multiple linear regression.

2.4 Data Collection

Data collection was conducted by trained research assistants using standardised procedures. All interviews were conducted in private consultation rooms at the health centre to protect confidentiality and facilitate questionnaire completion. The research assistants received training regarding participant communication, questionnaire administration, neutral probing, and data completeness checks. Completed forms were reviewed on the same day by a field supervisor. De-identified data were entered twice into a password-protected database, and discrepancies between the two entries were resolved by checking the original questionnaire.

2.5 Data Analysis

Categorical participant characteristics were summarised using frequencies and percentages. Continuous self-care behaviour, motivation, and self-efficacy scores were summarised using means, standard deviations, 95% confidence intervals for the means, medians, and interquartile ranges. The distributions of the three continuous outcome scores were examined using histograms, Q–Q plots, skewness, kurtosis, and the Shapiro–Wilk test. Bivariate comparisons were conducted using an independent-samples t test for sex and one-way analysis of variance for age, educational attainment, employment status, and duration of hypertension. An adjustment for unequal variances was applied when the homogeneity-of-variance assumption was not met. Each participant characteristic was examined separately in the bivariate analysis.

Three separate multiple linear regression models were constructed, with self-care behaviour, motivation, and self-efficacy entered as continuous dependent variables. Age, sex, educational attainment, employment status, and duration of hypertension were selected a priori based on the conceptual framework, clinical relevance, and previous evidence. All five variables were entered simultaneously into each model regardless of their bivariate p-values. Categorical predictors were represented using indicator variables. The comparison categories were age 61–70 years, male sex, diploma or bachelor's education, other employment, and a hypertension duration of 11–15 years. A positive unstandardised regression coefficient indicated a higher adjusted mean outcome score than the stated comparison category, whereas a negative coefficient indicated a lower adjusted mean score.

Multiple linear regression assumptions were assessed using residual-versus-predicted plots for linearity, the Breusch–Pagan test for homoscedasticity, variance inflation factors for multicollinearity, Cook's distance for influential observations, and the Shapiro–Wilk test for residual normality. Variance inflation factor values greater than 5 and Cook's distance values greater than 1 were considered potentially problematic. Regression results were reported as unstandardised regression coefficients (B), 95% confidence intervals, and p-values. Overall model performance was reported using R^2, adjusted R^2, and the model p-value. Statistical significance was defined as a two-sided p-value <0.05. Analyses were performed using IBM SPSS Statistics version 24. There were no missing values for the variables included in the analyses; therefore, all 120 participants were included in each model, and no missing-data imputation was required.

2.6 Ethical Considerations

Ethical approval was obtained from the Research Ethics Commission of ITEKES Bali (approval number 03.0233/KEPITEKES-BALI/VII/2024). All participants provided written informed consent before data collection. Participant information was de-identified, stored securely, and used exclusively for research purposes. Participation was voluntary, and participants could withdraw at any time without penalty or any effect on the healthcare services they received. The study was conducted in accordance with the Declaration of Helsinki.

RESULTS

3.1 Participant Characteristics

Of the 128 patients selected through simple random sampling, eight could not be contacted and therefore did not participate. Among the 120 patients who were successfully contacted, none declined participation. All 120 participants completed the study assessments and were included in the analysis, resulting in a response rate of 93.8%. The mean age was 57.3 years (SD 8.5). More than half of the participants were female (53.3%), and the majority were Hindu (78.3%). Junior high school was the most frequently reported

Table I: Sociodemographic and clinical characteristics of the participants (n = 120)

Characteristics	Frequency (f)	Percentage (%)
Age, years		
41-50	32	26.7
51-60	43	35.8
61-70	45	37.5
Mean (SD)	57.3 (8.5)	
Sex		
Male	56	46.7
Female	64	53.3
Religion		
Hinduism	94	78.3
Islam	16	13.3
Christianity	10	8.3
Education		
No school	25	20.8
Elementary school	26	21.7
Junior high school	27	22.5
Senior high school	26	21.7
Diploma or bachelor's degree	16	13.3
Employment		
Not employed	41	34.2
Private-sector employee	38	31.7
Civil servant	9	7.5
Other	32	26.7
Duration of hypertension, years		
1-5	39	32.5
6-10	65	54.2
11-15	16	13.3

Table II: Distribution of self-care behaviour, motivation, and self-efficacy scores (n = 120)

Category	f	%	Mean (SD)	95% CI of mean	Median (IQR)
Behaviour					
Poor	43	35.8			
Moderate	70	58.3	4.09 (9.13)	42.44–45.74	44.5 (37.0–51.0)
Good	7	5.8			
Motivation					
Poor	39	32.5			
Moderate	63	52.5	44.64 (11.51)	42.56–46.72	43.0 (33.0–51.0)
Good	18	15.0			
Self-Efficacy					
Poor	51	42.5			
Moderate	60	50.0	42.99 (9.88)	41.21–44.78	42.0 (33.0–51.0)
Good	9	7.5			

Note: Higher scores indicate better self-care behaviour, motivation, or self-efficacy. Categories were defined as poor (<40), moderate (40–59), and good (≥60) and were used only for descriptive presentation. CI, confidence interval; IQR, interquartile range; SD, standard deviation.

educational category (22.5%), 34.2% were not employed, and 54.2% had lived with hypertension for 6–10 years (Table I).

3.2 Distribution of self-care behaviour, motivation, and self-efficacy scores

The mean self-care behaviour score was 44.09 (SD 9.13; 95% CI 42.44–45.74), with a median of 44.5 (IQR 37.0–51.0). The mean motivation score was 44.64 (SD 11.51; 95% CI 42.56–46.72), with a median of 43.0 (IQR 33.0–51.0). The mean self-efficacy score was 42.99 (SD 9.88; 95% CI 41.21–44.78), with a median of 42.0 (IQR 33.0–51.0) (Table II). Both mean-based and median-based summaries are presented because the raw score distributions showed some departure from normality. For supplementary descriptive presentation, 58.3% of participants were classified as having moderate self-care behaviour, 52.5% as having moderate motivation, and 50.0% as having moderate self-efficacy. These categories were used only to describe the score distributions and were not used in the bivariate or multivariable analyses.

3.3 Bivariate analysis

Self-care behaviour scores differed significantly according to age (p=0.043), educational attainment (p=0.002), employment status (p=0.003), and duration of hypertension (p=0.001). No significant difference in self-care behaviour scores was observed according to sex (p=0.709). Motivation scores differed significantly according to employment status (p=0.029), but not according to age, sex, educational attainment, or duration of hypertension. No statistically significant differences in self-efficacy scores were observed according to the participant characteristics examined (Table III).

Table III: Bivariate associations of participant characteristics with self-care behaviour, motivation, and self-efficacy (n = 120)

Variable	Behaviour		Motivation		Self-efficacy	
	mean (SD)	p-value	mean (SD)	p-value	mean (SD)	p-value
Age group		0.043		0.068		0.393
41–50 years	46.44 (9.88)		48.47 (11.65)		44.91 (11.03)	
51–60 years	45.09 (8.76)		44.28 (11.55)		43.00 (9.57)	
61–70 years	41.47 (8.45)		42.27 (10.89)		41.62 (9.28)	
Sex	0.709		0.255		0.948	
Female	43.80 (8.74)		43.50 (10.02)		43.05 (9.76)	
Male	44.43 (9.63)		45.95 (12.97)		42.93 (10.10)	
Education		0.002		0.167		0.228
No school	38.72 (9.88)		41.76 (13.33)		39.88 (9.73)	
Elementary school	44.46 (8.61)		45.08 (10.57)		41.58 (9.42)	
Junior high school	42.44 (6.61)		41.85 (8.19)		43.00 (9.05)	
Senior high school	47.12 (9.21)		47.31 (10.76)		46.27 (10.82)	
Diploma or bachelor's degree	49.75 (7.84)		48.81 (14.55)		44.81 (9.79)	
Employment		0.003		0.029		0.073
Not employed	41.98 (8.08)		41.59 (11.43)		42.20 (9.23)	
Private-sector employee	48.32 (8.95)		48.95 (10.32)		45.34 (10.67)	
Civil servant	48.22 (9.72)		47.00 (14.12)		47.89 (11.36)	
Other	40.63 (8.40)		42.78 (10.99)		39.84 (8.41)	
Duration of hypertension		0.001		0.317		0.278
1–5 years	39.54 (8.40)		42.64 (12.74)		40.95 (9.21)	
6–10 years	46.11 (7.64)		46.15 (10.31)		43.95 (9.38)	
11–15 years	47.00 (12.38)		43.38 (12.78)		44.06 (12.95)	

Note: Values are presented as mean (SD). Bivariate comparisons were conducted using an independent-samples t test for sex and one-way analysis of variance for characteristics with three or more categories. An adjustment for unequal variances was applied when appropriate. Each characteristic was examined separately without adjustment for the other variables.

3.4 Multivariable Analysis

Three separate multiple linear regression models were constructed for self-care behaviour, motivation, and self-efficacy. The comparison categories were age 61–70 years, male sex, diploma or bachelor's education, other employment, and a hypertension duration of 11–15 years. A positive B coefficient indicates a higher adjusted mean score than the stated comparison category, whereas a negative B coefficient indicates a lower adjusted mean score.

Self-care behaviour

The self-care behaviour model was statistically significant (R^2=0.375; adjusted R^2=0.304; p<0.001). After adjustment for the other participant characteristics, participants aged 41–50 years had self-care behaviour scores that were, on average, 5.07 points higher than those aged 61–70 years (B=5.07; 95% CI 1.38–8.75; p=0.008). Participants with no formal schooling had scores that were 8.88 points lower than those with a diploma or bachelor's degree (B=–8.88; 95% CI –14.15 to –3.61; p=0.001), while those who had completed junior high school had scores that were 5.62 points lower (B=–5.62; 95% CI –10.85 to –0.39; p=0.035).

Private-sector employees had self-care behaviour scores that were 7.22 points higher than participants in the other-employment category (B=7.22; 95% CI 3.47–10.96; p<0.001). Participants who had lived with hypertension for 1–5 years had scores that were 5.61 points lower than those who had lived with hypertension for 11–15 years (B=–5.61; 95% CI –10.28 to –0.93; p=0.019). The remaining adjusted associations were not statistically significant (Table IV).

Motivation

The motivation model was statistically significant but explained a smaller proportion of the score variance (R^2=0.186; adjusted R^2=0.094; p=0.028). Participants aged 41–50 years had motivation scores that were, on average, 5.43 points higher than those aged 61–70 years (B=5.43; 95% CI 0.13–10.73; p=0.045). Participants who had completed junior high school had motivation scores that were 8.24 points lower than those with a diploma or bachelor's degree (B=–8.24; 95% CI –15.76 to –0.72; p=0.032). No other adjusted association with motivation was statistically significant (Table IV).

Self-efficacy

The overall self-efficacy model was not statistically significant (R^2=0.131; adjusted R^2=0.033; p=0.206). Private-sector employment showed a positive coefficient compared with other employment (B=5.49; 95% CI 0.71–10.26; p=0.025). However, because the overall model was not statistically significant, this category-specific estimate was considered exploratory and was not interpreted as a conclusive independent association (Table IV).

Model assessment

Variance inflation factor values ranged from 1.12 to 2.59, indicating no problematic multicollinearity. Visual examination of the residual-versus-predicted plots did not indicate material violations of linearity. The Breusch–Pagan tests were non-significant for the self-care behaviour (χ^2=12.43; p=0.412), motivation (χ^2=12.60; p=0.399), and self-efficacy models (χ^2=15.30; p=0.226), indicating no evidence of heteroscedasticity. The maximum Cook's distance was 0.155 for self-care behaviour, 0.145 for motivation, and 0.070 for self-efficacy; all values were below the prespecified threshold of 1. Residual normality was acceptable for the self-care behaviour (Shapiro–Wilk W=0.987; p=0.292) and self-efficacy models (W=0.982; p=0.111). The motivation-model residuals showed some departure from normality (W=0.932; p<0.001); therefore, its category-specific estimates were interpreted cautiously.

Table IV: Multiple linear regression of factors associated with continuous self-care behaviour, motivation, and self-efficacy scores (n = 120)

Outcome and predictor	Comparison	B	95% CI	p-value
Self-care behaviour	Model: R^2=0.375; adjusted R^2=0.304; p<0.001			
Age	41–50 vs 61–70 years	5.07	1.38 to 8.75	0.008
	51–60 vs 61–70 years	2.76	–0.59 to 6.11	0.105
Sex	Female vs male	0.97	–1.95 to 3.89	0.513
Educational attainment	No formal schooling vs diploma/bachelor's	–8.88	–14.15 to –3.61	0.001
	Elementary school vs diploma/bachelor's	–3.33	–8.42 to 1.76	0.198
	Junior high school vs diploma/bachelor's	–5.62	–10.85 to –0.39	0.035
	Senior high school vs diploma/bachelor's	–1.32	–6.18 to 3.53	0.590
Employment status	Not employed vs other	1.88	–1.96 to 5.72	0.334
	Private-sector employee vs other	7.22	3.47 to 10.96	<0.001
	Civil servant vs other	2.89	–3.39 to 9.17	0.364
Duration of hypertension	1–5 vs 11–15 years	–5.61	–10.28 to –0.93	0.019
	6–10 vs 11–15 years	–1.29	–5.74 to 3.17	0.568
Motivation	Model: R^2=0.186; adjusted R^2=0.094; p=0.028			
Age	41–50 vs 61–70 years	5.43	0.13 to 10.73	0.045
	51–60 vs 61–70 years	1.06	–3.75 to 5.88	0.663
Sex	Female vs male	–0.67	–4.87 to 3.53	0.753
Educational attainment	No formal schooling vs diploma/bachelor's	–7.09	–14.66 to 0.49	0.067
	Elementary school vs diploma/bachelor's	–3.06	–10.38 to 4.27	0.410
	Junior high school vs diploma/bachelor's	–8.24	–15.76 to –0.72	0.032
	Senior high school vs diploma/bachelor's	–1.38	–8.36 to 5.60	0.696
Employment status	Not employed vs other	–1.28	–6.80 to 4.25	0.648
	Private-sector employee vs other	5.17	–0.21 to 10.55	0.060
	Civil servant vs other	–0.79	–9.82 to 8.24	0.863
Duration of hypertension	1–5 vs 11–15 years	1.61	–5.10 to 8.33	0.635
	6–10 vs 11–15 years	3.71	–2.69 to 10.12	0.253
Self-efficacy	Model: R^2=0.131; adjusted R^2=0.033; p=0.206			
Age	41–50 vs 61–70 years	3.37	–1.33 to 8.07	0.158
	51–60 vs 61–70 years	1.60	–2.67 to 5.87	0.459
Sex	Female vs male	0.81	–2.91 to 4.54	0.666
Educational attainment	No formal schooling vs diploma/bachelor's	–3.20	–9.93 to 3.52	0.347
	Elementary school vs diploma/bachelor's	–1.34	–7.83 to 5.15	0.683
	Junior high school vs diploma/bachelor's	0.15	–6.52 to 6.82	0.964
	Senior high school vs diploma/bachelor's	2.39	–3.81 to 8.58	0.446
Employment status	Not employed vs other	3.28	–1.62 to 8.17	0.188
	Private-sector employee vs other	5.49	0.71 to 10.26	0.025
	Civil servant vs other	5.90	–2.11 to 13.91	0.147
Duration of hypertension	1–5 vs 11–15 years	–2.55	–8.51 to 3.41	0.398
	6–10 vs 11–15 years	–0.63	–6.31 to 5.05	0.825

Note: B is the unstandardised regression coefficient. A positive B value indicates that the adjusted mean outcome score was higher than the stated comparison category, whereas a negative B value indicates that the adjusted mean score was lower. All predictors were entered simultaneously into each model. CI, confidence interval.

3.5 Differences between bivariate and multivariable findings

Some differences were observed between the bivariate and multivariable findings. For example, age and educational attainment were not significantly associated with motivation in the bivariate analysis, but specific age and educational comparisons became significant after adjustment. Conversely, employment status was associated with motivation in the bivariate analysis, but none of the individual employment comparisons remained significant in the adjusted model. These findings are not necessarily contradictory because the two analyses address different statistical questions. The bivariate analysis in Table III assessed the overall differences across all categories of each participant characteristic without accounting for the other variables. In contrast, the multiple linear regression in Table IV estimated specific category-to-comparison-category differences after adjustment for the other characteristics included in the model. Consequently, an association may become stronger or weaker after adjustment because of potential confounding and the use of a specific comparison category.

DISCUSSION

This study examined age, sex, educational attainment, employment status, and duration of hypertension in relation to three parallel HBP-SCP outcomes. The hypotheses were partly supported because the selected characteristics showed different patterns of association across the three separately analysed outcomes. The models explained more variation in self-care behaviour than in motivation and little adjusted variation in self-efficacy. These patterns represent outcome-specific findings rather than a formal statistical comparison of coefficients across models. Behavioural performance, motivation, and confidence should therefore not be interpreted as interchangeable dimensions of hypertension self-management.

Within the Health Belief Model, age, educational attainment, employment status, and duration of hypertension can be understood as modifying factors that may shape patients' exposure to health information, perceived barriers, cues to action, and opportunities to perform self-care. However, perceived susceptibility, severity, benefits, barriers, and cues to action were not directly measured. The model therefore provided a framework for variable selection and interpretation but was not tested as a complete theoretical pathway. The relatively limited explanatory capacity of the motivation and self-efficacy models suggests that future studies should measure these core beliefs directly.

Participants aged 41–50 years had higher adjusted self-care behaviour and motivation scores than those aged 61–70 years, whereas participants aged 51–60 years did not differ significantly from the comparison category. The findings therefore do not demonstrate a consistent linear decline in self-management with age. Previous evidence regarding age has been mixed, and age-related differences may coexist with variation in functional condition, disease burden, social support, healthcare experience, and opportunities to perform self-care.[2,5,14] Because these factors were not directly measured, the mechanisms underlying the observed age associations remain uncertain.

Educational attainment was more clearly associated with self-care behaviour than with the other outcomes. Participants with no formal schooling and those who had completed junior high school had lower adjusted self-care behaviour scores than participants with a diploma or bachelor's degree. Junior high school education was also associated with lower motivation. However, elementary- and senior-high-school education did not differ significantly from the comparison category, and educational attainment was not independently associated with self-efficacy. The pattern was therefore not strictly graded. Previous Indonesian primary care research has similarly reported differences in hypertension self-care according to educational attainment, although the outcome definitions and analytical approaches differed.[19]

Formal education may reflect opportunities to access, understand, and apply health information, but it should not be considered equivalent to health literacy. Studies among adults with hypertension have linked health literacy with self-care behaviour and self-efficacy, while more recent evidence suggests that illness perception and self-efficacy may partly explain the relationship between health literacy and self-management.[20–22] Indonesian evidence has also identified motivation and self-efficacy as proximal correlates of self-care behaviour.[17] Because health literacy and illness perception were not measured in the present study, they remain plausible explanatory pathways rather than demonstrated mechanisms.

Private-sector employment was associated with higher self-care behaviour than the heterogeneous other-employment category, but not with motivation, and the overall self-efficacy model was not significant. Employment may reflect differences in financial resources, daily routines, workplace support, health information, or access to healthcare. Conversely, work responsibilities may limit the time available for self-care. Recent research has shown that employment and income may coexist with differences in health outcomes among patients with hypertension.[22] The adoption of home blood pressure monitoring may also depend on patient resources, knowledge, healthcare-provider support, and access to monitoring devices.[23] Income, working conditions, job flexibility, insurance coverage, and access to equipment were not measured in this study. The observed coefficient should therefore be interpreted as an association between employment categories rather than evidence that private-sector employment itself improves self-care.

Participants who had lived with hypertension for 1–5 years had lower self-care behaviour scores than those with a duration of 11–15 years, but duration was not associated with motivation or self-efficacy. Longer disease experience may provide repeated opportunities to receive counselling, become familiar with treatment requirements, and establish self-care routines. However, duration may also coexist with treatment burden, comorbidities, and changes in adherence. Reviews indicate that disease knowledge, medication-related factors, social support, and healthcare access interact in hypertension self-management, while Indonesian primary care data demonstrate substantial variation in medication adherence, lifestyle modification, and blood pressure control.[2,20] Evidence from rural Indonesia also suggests that education combined with continuing follow-up can support the maintenance of recommended dietary behaviour and blood pressure control.[23] Nevertheless, the cross-sectional design of the present study cannot establish whether longer duration improved self-care or whether participants with better self-care remained more consistently engaged with long-term services.

The non-significant self-efficacy model is also informative. The examined characteristics explained little adjusted variation in self-efficacy, suggesting that confidence in performing hypertension self-care may be more closely related to psychological, informational, and social factors than to demographic characteristics alone. Previous studies have linked self-efficacy and self-management with motivation, health literacy, illness perception, perceived social support, resilience, and empowerment.[17,21-22,24-25] These findings identify relevant constructs for future investigation but do not establish the mechanisms operating in the present sample. The positive private-sector coefficient should remain exploratory because the overall self-efficacy model was not statistically significant.

These findings support individualised nursing assessment rather than a specific intervention. Age, educational attainment, employment status, and hypertension duration may prompt assessment of treatment understanding, daily barriers, previous self-management experience, motivation, confidence, social support, and access to monitoring resources; however, these characteristics should not be used as deterministic labels. Future prospective studies should evaluate whether nurse-led support tailored to directly measured needs improves self-management and blood pressure outcomes.[23,27-29]

STUDY LIMITATIONS

Several limitations should be considered. The cross-sectional design precludes temporal and causal inference, while the single-centre setting and exclusion of patients with severe hypertension may limit generalisability. Self-reported outcomes may have been affected by recall and social desirability bias. Although the response rate was high, eight selected patients could not be contacted; therefore, non-response bias cannot be excluded. Small numbers in several participant categories may have reduced the precision of category-specific estimates. Residual confounding remains possible because health literacy, medication adherence, household income, family and social support, blood pressure control, health insurance, comorbidities, treatment complexity, and access to healthcare were not measured. The motivation-model residuals departed from normality; therefore, its estimates should be interpreted cautiously. Finally, the descriptive score categories were not validated clinical thresholds.

CONCLUSION

Age, educational attainment, employment status, and duration of hypertension were associated mainly with self-care behaviour, while age and educational attainment were also associated with motivation. The overall model for self-efficacy was not statistically significant. Because this was a single-centre cross-sectional study with potential residual confounding, the findings should not be interpreted causally. Multicentre prospective studies should directly assess health literacy, adherence, social support, income, comorbidities, insurance coverage, and access to care before evaluating nurse-led support tailored to patients' assessed needs.

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CONFLICT OF INTEREST

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

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