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Behavioural and self-management in hypertension: A scoping review

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Abstract

Background: Despite strong guideline support for non-pharmacological hypertension management, evidence on the behavioural and self-management strategies most consistently implemented and reported across original studies remains fragmented.

Purpose: To map behavioural and self-management strategies for adult hypertension, identify well-researched approaches, and highlight underrepresented populations and intervention delivery models requiring further investigation.

Method: A scoping review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) framework. Original research articles published in English between 2016 and 2026 that examined behavioural and self-management interventions for adults with hypertension were systematically identified, screened, and mapped.

Results: Twenty-nine original studies from 19 countries were included. The interventions were predominantly digital or mobile health (mHealth) coaching, dietary counselling, and stress-management approaches. Multicomponent interventions combining professional support with digital delivery demonstrated the most consistent improvements in blood pressure outcomes.

Discussion: The findings indicate that professionally supported, multicomponent digital interventions may provide a promising approach to improving blood pressure control and supporting self-management among adults with hypertension. However, substantial variation in intervention components, delivery models, and study populations limits direct comparison across studies.

Conclusion: Future research should prioritise longer follow-up periods, standardised intervention reporting, and adaptation of behavioural and self-management interventions to low-resource settings to improve their applicability and sustainability.

Keywords: Behavioural; Dietary; Hypertension; Scoping Review; Self-Management.

INTRODUCTION

Hypertension continues to affect more than one billion adults worldwide and remains one of the leading modifiable contributors to cardiovascular morbidity and mortality (Valenzuela et al., 2020). Contemporary clinical guidelines increasingly position behavioural and self-management strategies—including dietary

modification, physical activity, stress reduction, and structured self-monitoring—as first-line or complementary components of hypertension management rather than optional adjuncts (Charchar et al., 2024). This shift reflects growing recognition that effective blood pressure control extends beyond

pharmacological treatment and requires sustained behavioural change, patient engagement, and active self-management to support long-term outcomes.

Despite the increasing use of digital health platforms, professional counselling, mindfulness-based programmes, and community-based self-monitoring initiatives, evidence on behavioural and self-management interventions remains fragmented across disciplines and healthcare settings. Previous studies have examined diverse intervention designs, delivery methods, target populations, and behavioural components, making it difficult to obtain a comprehensive understanding of how these strategies have been implemented and evaluated in primary research (Dhungana et al., 2022; Ferdinand et al., 2023). Existing evidence syntheses have largely focused on estimating pooled intervention effects through systematic reviews and meta-analyses. Although these approaches are valuable for assessing overall efficacy, they provide less insight into the breadth and characteristics of intervention formats, delivery models, populations, and self-management components represented across the original literature.

Accordingly, this scoping review aims to map original research on behavioural and self-management interventions for adults with hypertension published in English between 2016 and 2026. Rather than re-estimating pooled effects, the review describes the geographical distribution, study designs, intervention characteristics, delivery approaches, and behavioural strategies reported in the primary literature. By identifying areas that have been extensively studied as well as underrepresented populations and intervention delivery models, this review seeks to provide a useful evidence map for clinicians, nurse educators, policymakers, and researchers and to inform priorities for future research.

RESEARCH METHOD

This scoping review was conducted using the Arksey and O'Malley framework as further refined by the Joanna Briggs Institute (JBI). Reporting followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) guidelines.

Studies were eligible if they met the following criteria: (1) original research articles, including randomised controlled trials, quasi-experimental studies, cohort studies, cross-sectional studies, or other primary intervention or observational designs; (2) published in English between 2016 and 2026; (3) conducted among adults aged ≥ 18 years who had hypertension or were at risk of hypertension; and (4) evaluated at least one behavioural, lifestyle, or self-management strategy relevant to hypertension management, including dietary modification, physical activity, stress management, digital or mobile health (mHealth) coaching, or structured self-monitoring.

Systematic reviews, meta-analyses, scoping reviews, narrative reviews, conference commentaries or other publications without primary research data, and non-English publications were excluded.

Candidate records were identified through a structured search of Google Scholar using predefined search queries. The initial search yielded 493 records, and an additional 50 records were identified through backward and forward citation chaining, resulting in 543 candidate records. Titles and abstracts were screened according to the predefined eligibility criteria, with systematic reviews, meta-analyses, and other non-original research publications excluded at this stage. The full texts of potentially eligible records were subsequently assessed for eligibility. Studies were retained only when they reported original research and included a clearly identifiable behavioural, lifestyle, or self-management strategy relevant to hypertension. Following the screening and eligibility assessment process, 29 original studies were included in the final synthesis.

Data were extracted systematically from each included study using a predefined data extraction framework. The extracted variables included country of study, publication year, study title, research method or design, and the primary behavioural, lifestyle, or self-management strategy evaluated. The extracted information was organised into a descriptive evidence map and tabulated to summarise the characteristics and distribution of the included studies. Findings were synthesised descriptively and presented in the Results section.

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RESEARCH RESULTS

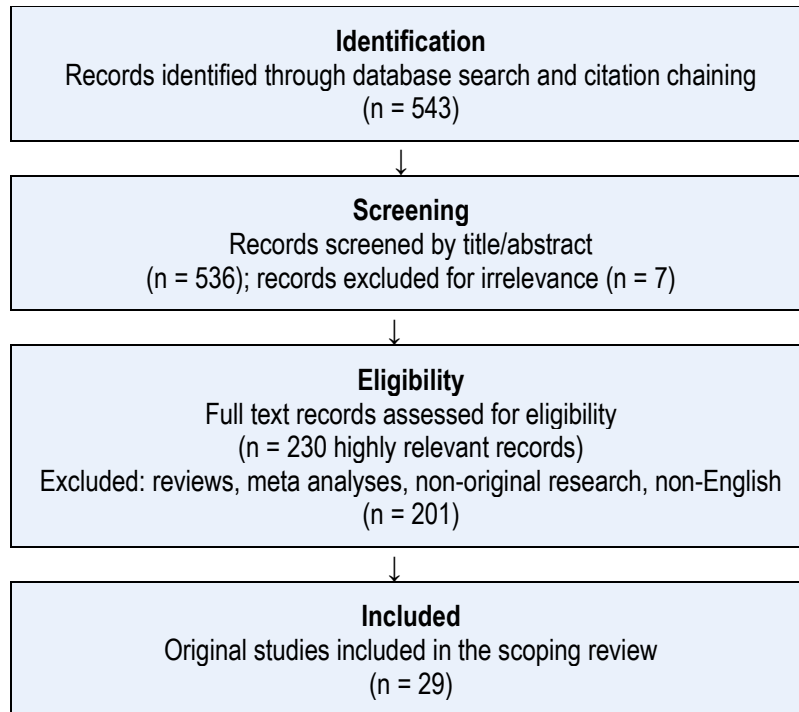


Figure 1. PRISMA-ScR flow diagram of the study selection process.

Twenty-nine original studies met the inclusion criteria, representing 16 countries across North America, South America, Europe, and Asia. As summarised in Table 1, the geographical distribution was dominated by the United States, which contributed 12 studies (41.4%). Germany and China each contributed two studies (6.9%), while South Korea, Turkey, Japan, Saudi Arabia, Indonesia, Canada, Taiwan, Iran, Thailand, Brazil, the Philippines, Spain, and Greece each contributed one study (3.4%).

Regarding study design, randomised controlled trials (RCTs) were the most frequently represented design, comprising 19 studies (65.5%), including conventional, pilot, and decentralised RCTs. Five studies (17.2%) used quasi-experimental designs, while five studies (17.2%) employed observational or non-randomised designs, including cohort, retrospective cohort, longitudinal, and single-arm designs. The included studies evaluated a diverse range of behavioural and self-management strategies, with digital or mHealth-based interventions, dietary counselling, physical activity programmes, stress management, and structured self-monitoring being the most commonly represented approaches.

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Table 1. Characteristics of Included Studies

(Author, Year) Country	Study Design	Population/Sample	Behavioural/Self- management Strategy	Delivery Mode	Main Outcome/Key Findings
(Beger et al., 2025) Germany	Decentralized single-blind RCT	Adults with uncontrolled hypertension; n=139	Multimodal lifestyle coaching: diet, physical activity, self-monitoring	Mobile app	SBP, DBP, body weight, QoL, food literacy; intervention reduced SBP by 8.5 mmHg at 12 weeks. (Frontiers)
(Lim et al., 2025) South Korea	RCT	Adults with prehypertension/stage 1 hypertension	Structured dietary counselling + aerobic exercise	Counselling + exercise sessions	BP and lifestyle-related outcomes
(Meşhur et al., 2025) Turkey	Quasi-experimental	Adults with hypertension	DASH dietary education + mindfulness	Mobile app	DASH adherence, QoL, mindfulness/stress, BP
(Miller et al., 2025) United States	RCT	US adults; digital intervention participants	Digital DASH dietary coaching	Digital/mobile intervention	DASH adherence and BP; published in 2025. (PubMed)
(Leitner et al., 2024) United States	Single-arm nonrandomized trial	Adults with hypertension; n=141	AI-driven personalized lifestyle coaching	Mobile app + SMS + BP monitor + wearable	SBP/DBP, BP control, engagement; SBP decreased 8.1 mmHg at 24 weeks. (PubMed)
(Wildenauer et al., 2024) Germany	Pilot RCT	Adults with arterial hypertension	App-based lifestyle self- management	Digital app	SBP, DBP, HR, patient activation. (Wiley Online Library)
(Wang et al., 2025) China	Randomized trial	Floating elderly patients with hypertension; n=200	Combined online/offline health education	Online + offline education	Hypertension self-management and BP- related outcomes. (M Social Sciences)

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(Author, Year) Country	Study Design	Population/Sample	Behavioural/Self- management Strategy	Delivery Mode	Main Outcome/Key Findings
(Patil et al., 2024) United States	Mixed-methods pre- post study	Uncontrolled hypertension; n=31 completers	BP/emotion/behavior self- monitoring + coping and lifestyle education	Shared medical appointments + printed materials	SBP decreased 11.6 mmHg; hypertension control improved. (Wiley Online Library)
(Kario et al., 2026) Japan	Multicenter intervention study	Adults with hypertension; n=198	Smartphone-based digital therapeutics, self- monitoring, behavioral modification	Smartphone + digital devices	Home BP, weight, activity, sleep; determinants of BP reduction. (PubMed)
(Pathan et al., 2023) Saudi Arabia/India	RCT	Patients with essential hypertension	Slow breathing + progressive muscle relaxation	Exercise/training sessions	BP, HR, RR and anxiety; combined intervention improved several outcomes. (PubMed)
(Susila et al., 2024) Indonesia	Quasi-experimental	Adults with hypertension	Health education + stress management	Educational/training sessions	BP and stress-related outcomes
(Dodani et al., 2024) United States	RCT	African American adults with hypertension	Behavioral lifestyle coaching	Telehealth	BP, lifestyle behavior and self- management
(Dorsch et al., 2025) United States	RCT	Adults with hypertension; n=602	JITAI for physical activity + lower-sodium diet	Mobile app	SBP, physical activity, sodium intake; no significant SBP difference, but activity and sodium outcomes improved. (Nature)
(Chang et al., 2022) United States	RCT	Adults with hypertension	Dietitian-led counselling	lifestyle Telehealth	BP and lifestyle outcomes. (PubMed)

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(Author, Year) Country	Study Design	Population/Sample	Behavioural/Self- management Strategy	Delivery Mode	Main Outcome/Key Findings
(Wu et al., 2023) United States	Retrospective cohort	Commercially insured adults; n=1,117	Digital BP self-monitoring + behavior-change coaching	Digital platform + home BP monitoring	SBP, DBP, weight, BMI; significant reductions over 12 months. (PubMed)
(Marin-Couture et al., 2024) Canada	RCT	Adults with hypertension	Multicomponent lifestyle medicine	Primary-care programme	BP and lifestyle outcomes
(Zhou et al., 2022) China	RCT	Community-dwelling adults with hypertension	Web-based management/self-management	BP Web platform	BP control and self-management
(Chen & Kao, 2021) Taiwan	RCT	Adults with hypertension	Web-based lifestyle and BP self-management	Web platform	BP and lifestyle behavior
(Bozorgi et al., 2021) Iran	RCT	Adults with hypertension	Mobile BP self-management	Mobile application	BP and self-management behavior
(Jumneansuk et al., 2024) Thailand	Quasi-experimental	Older adults with hypertension	TTM-based behavioral self-management calendar	Printed calendar/tool	Self-management and BP
(Bersch-Ferreira et al., 2024) Brazil	RCT	Adults with hypertension	Nutritional counselling	Dietary counselling	Dietary behavior and BP
(Mirsky et al., 2025) United States	Cohort study	Adults with hypertension	Virtual group lifestyle sessions + home BP monitoring	Virtual group visits + home monitoring	BP and lifestyle self-management

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(Author, Year) Country	Study Design	Population/Sample	Behavioural/Self- management Strategy	Delivery Mode	Main Outcome/Key Findings
(Buis et al., 2024) United States	RCT	Black adults with uncontrolled hypertension	Self-monitoring with connected BP device	Bluetooth BP cuff + mobile app	BP control and self-monitoring
(Hashemi et al., 2022) United States	Community-based open-label study	Older adults at senior centers	DASH meals + self-measured BP	Community centers	Dietary behavior and BP. (PubMed)
(Botabara et al., 2023) Philippines	Interventional cohort	Adults with hypertension	Structured lifestyle reversal programme	Lifestyle programme	BP and hypertension status
(Múzquiz-Barberá et al., 2022) Spain	RCT	Adults with hypertension/cardiovascular risk	Web-based education	Web platform	Lifestyle behavior and cardiovascular outcomes
(An et al., 2021) United States	RCT	Adults with elevated BP/hypertension	Mindfulness-based lifestyle intervention	Mindfulness sessions/programme	Lifestyle behavior, stress and BP
(Darviri et al., 2016) Greece	Quasi-experimental	Adults with cardiovascular risk/hypertension	Stress management + health promotion	Group-based programme	Stress, lifestyle behavior and cardiovascular risk
(Bakre et al., 2022) United States	Longitudinal study	Adults using personalized nutrition intervention	Personalized dietary guidance	Digital nutrition platform	Dietary behavior and BP

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DISCUSSION

Digital and mHealth Self-Monitoring and Coaching

Digital and mHealth coaching emerged as the predominant strategy in the reviewed literature, although the magnitude of blood pressure reduction varied according to intervention intensity, patient engagement, and follow-up duration. The HYPE app demonstrated mean reductions of 8.5 mmHg in systolic blood pressure (SBP) and 5.06 mmHg in diastolic blood pressure (DBP) over 12 weeks, accompanied by modest weight loss. These findings suggest that app-based multimodal coaching combined with self-monitoring and structured feedback may support short-term improvements in blood pressure management (Beger et al., 2025). Similarly, the B INDEX digital therapeutics programme produced a 6.2 mmHg reduction in early SBP within four weeks, indicating that measurable improvements may occur relatively early during digital intervention; however, the longer-term sustainability of this effect was not established within the study period (Kario et al., 2026).

Zhou et al. (2022) reported that a web-based community management platform reduced SBP by approximately 8 mmHg and increased the proportion of participants achieving blood pressure control from 42.0% in the control group to 65.9% in the intervention group. This finding indicates that digitally supported community management may influence both continuous blood pressure measures and the proportion of patients achieving predefined control targets. Likewise, a web-based self-management programme in Taiwan was associated with significant reductions in blood pressure and improvements in medication adherence, suggesting that digital self-management may complement pharmacological treatment by supporting adherence-related behaviours (Chen & Kao, 2021).

However, the effects of digital interventions were not uniformly large. Wildenauer et al. (2024) reported a smaller reduction in SBP and no significant between-group difference in DBP. Similarly, the mHealth self-monitoring trial among Black adults with uncontrolled hypertension demonstrated substantial SBP reductions among participants who remained engaged in the intervention, highlighting the importance of retention and sustained engagement in determining the

population-level effectiveness of digital interventions (Buis et al., 2024). Overall, these findings suggest that the effectiveness of digital hypertension interventions depends not only on the technological platform itself but also on the intensity of behavioural support, feedback mechanisms, adherence, and continued participant engagement.

Dietary Counselling and DASH-Based Strategies

Structured dietary counselling, particularly interventions based on the Dietary Approaches to Stop Hypertension (DASH) dietary pattern, consistently demonstrated potential benefits for blood pressure management and, in several studies, body weight. A dietitian-led telehealth intervention suggested that professionally guided dietary counselling may contribute to blood pressure improvement partly through sustained changes in body weight and dietary behaviour (Chang et al., 2022). Similarly, structured dietary counselling combined with aerobic exercise produced one of the larger office-based reductions in blood pressure among the reviewed interventions, indicating that integrating dietary modification with physical activity may provide broader behavioural support than dietary counselling alone (Lim et al., 2025).

A digital personalised nutrition platform also demonstrated an association between improved blood pressure control and sustained engagement with individualised dietary feedback during longitudinal follow-up (Bakre et al., 2022). These findings emphasise the potential value of personalised dietary guidance, particularly when patients receive repeated feedback and monitoring rather than one-time dietary advice.

In contrast, a community-based DASH congregate meal intervention combined with self-measured blood pressure monitoring resulted in a more modest early reduction in SBP (Cua et al., 2022). This difference may reflect variations in intervention intensity, duration, delivery setting, and participant engagement. Collectively, the findings indicate that dietary interventions can contribute to hypertension management, but their effects may be enhanced when dietary modification is supported by physical activity, self-monitoring, or ongoing professional feedback.

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Multi-Component and Professionally Supported Telehealth Programmes

Multi-component interventions integrating dietary modification, physical activity, self-monitoring, behavioural support, and professional supervision demonstrated favourable outcomes across several studies. The Canadian randomized controlled trial by Marin-Couture et al. (2024) evaluated a lifestyle medicine intervention for systemic hypertension in primary care, illustrating the potential role of an integrated lifestyle approach within routine healthcare services. Rather than focusing on a single behavioural component, lifestyle medicine interventions address multiple modifiable factors simultaneously, including dietary behaviour, physical activity, weight management, and self-management.

Similarly, the telehealth-based HEALS Med Tech programme for African American participants produced a substantial reduction in SBP after three months, supporting the potential value of culturally tailored, professionally supported, multi-component interventions for populations experiencing a disproportionate burden of uncontrolled hypertension (Dodani et al., 2024). A retrospective evaluation of a digital hypertension self-management programme found that, among participants with uncontrolled blood pressure at baseline, SBP decreased by 8.1 mmHg and 48% moved into an improved blood pressure category (Wu et al., 2023). This finding is important because it demonstrates that intervention effects may be reflected not only in mean blood pressure changes but also in movement across clinically relevant control thresholds.

Virtual group visits combined with home blood pressure monitoring were also associated with significant reductions in day-to-day SBP and DBP and enabled reductions or discontinuation of antihypertensive medication in some participants (Mirsky et al., 2025). Nevertheless, multi-component interventions did not consistently demonstrate superior outcomes compared with usual care. In a public health system, a two-component nutritional intervention did not produce a significant between-group difference in SBP reduction or blood pressure control, suggesting that the additional benefit of an intervention may depend on the

intensity and content of the comparator condition (Bersch-Ferreira et al., 2024).

Overall, these studies indicate that multi-component interventions are promising because they address several behavioural determinants of hypertension simultaneously. However, their effectiveness cannot be attributed simply to the number of components included. Intervention intensity, professional support, cultural adaptation, baseline risk, comparator characteristics, and participant engagement are also likely to influence outcomes.

Stress Management and Mindfulness-Based Strategies

Mindfulness and stress-management interventions represented a smaller proportion of the reviewed literature than digital and dietary approaches but demonstrated potentially meaningful effects on blood pressure. An intervention focused on mindfulness and stress management produced a substantial reduction in SBP, indicating that psychosocial and attentional approaches may contribute to hypertension self-management (An et al., 2021). These findings are consistent with the broader concept that psychological stress and behavioural regulation can influence cardiovascular risk and may therefore represent relevant targets within lifestyle-based hypertension management.

The HEAL STRESS health promotion and stress-management initiative in Greece was associated with modest reductions in blood pressure and improvements in body mass index, although the magnitude of blood pressure change appeared less pronounced than that observed in more targeted mindfulness interventions (Darviri et al., 2016). Similarly, a health education and structured stress-management intervention among patients in Indonesia resulted in reductions in both SBP and DBP following the intervention (Susila et al., 2024).

Low-cost relaxation techniques may also provide useful complementary strategies. Slow breathing exercises and progressive muscle relaxation were associated with significant reductions in both SBP and DBP across the study period (Pathan et al., 2023). Taken together, these findings suggest that stress-

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management interventions may be particularly relevant as adjunctive components of lifestyle-based hypertension management. However, differences in intervention content, duration, adherence, and study design make direct comparison of effect sizes difficult.

Self-Monitoring, Adherence, and Behavioural Economics-Informed Strategies

A smaller group of studies focused specifically on self-monitoring and treatment-adherence support rather than comprehensive lifestyle modification. These interventions generally demonstrated improvements in adherence-related outcomes and modest changes in blood pressure. A mobile application for blood pressure management evaluated in Iran produced a relatively modest reduction in SBP while significantly improving treatment adherence scores, suggesting that the primary contribution of some digital interventions may be behavioural rather than a direct physiological effect (Bozorgi et al., 2021).

Similarly, the mobile application evaluated by Jumneansuk et al. (2024) was associated with a modest reduction in SBP and improvements in treatment adherence. These findings highlight the importance of distinguishing between interventions designed primarily to reduce blood pressure and those intended to modify behaviours that support long-term hypertension management.

Self-monitoring may function through several behavioural pathways, including increasing patients' awareness of their blood pressure status, reinforcing adherence, providing feedback on lifestyle behaviours, and facilitating communication with healthcare professionals. Therefore, the value of self-monitoring should not be assessed solely according to the magnitude of mean blood pressure reduction but also according to its effects on adherence and self-management behaviours.

Population and Geographic Considerations

An additional observation concerns the populations targeted by the reviewed interventions. Several studies specifically addressed African American or minority populations experiencing a disproportionate burden of uncontrolled hypertension (Buis et al., 2024; Dodani et

al., 2024). This reflects growing attention to culturally responsive and equity-oriented approaches to hypertension management.

However, studies from low- and middle-income countries remained less numerous than those from high-income settings, despite the inclusion of research conducted in countries such as Pakistan, Indonesia, Thailand, the Philippines, and Iran. This imbalance is consistent with broader observations that evidence for lifestyle-based hypertension interventions is still disproportionately generated in higher-resource settings (Ferdinand et al., 2023).

The geographic distribution of evidence is relevant because intervention feasibility, healthcare infrastructure, digital access, dietary patterns, socioeconomic conditions, and cultural norms can influence both intervention implementation and patient engagement. Consequently, findings from high-income healthcare systems may not be directly transferable to lower-resource settings without contextual adaptation. Future research should therefore expand implementation and effectiveness studies in diverse populations and healthcare systems, particularly in low- and middle-income countries.

LIMITATION AND IMPLICATION

This review has several limitations. First, because the primary objective was to map the available evidence rather than synthesize or pool effect estimates, no formal quality appraisal or risk-of-bias assessment was performed. Therefore, the strength or certainty of evidence supporting any individual strategy cannot be determined from this review alone. Second, substantial heterogeneity was observed in study designs, intervention characteristics, and outcome measures across the included studies, limiting direct comparisons between strategies.

Despite these limitations, the findings have several practical implications. For clinicians and nurse educators, the range of feasible and potentially low-cost self-management strategies, from calendar-based self-monitoring to structured breathing exercises, indicates that behavioural interventions can be adapted to different resource settings without necessarily requiring sophisticated digital infrastructure. For policymakers,

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the predominance of digital health evidence from high-income countries highlights the need to adapt, implement, and evaluate these strategies in low- and middle-income settings, particularly in Southeast Asia, where locally generated evidence remains comparatively limited.

CONCLUSION

Behavioural and self-management strategies for hypertension encompass a diverse range of digital, dietary, stress-management, physical activity, self-monitoring, and community-based approaches delivered through various formats and settings. Digital and mHealth interventions were frequently represented among the included studies, alongside professionally supported and non-digital strategies such as dietary counselling, structured exercise, breathing and relaxation techniques, and community-based self-monitoring. The available evidence indicates substantial variation in intervention characteristics, delivery modes, and outcome measures, highlighting the need for context-specific implementation and further evaluation.

RECOMMENDATION

Future research should prioritize longer-term follow-up, standardized outcome measures, comparative evaluation of different modes of behavioural and self-management support, and adaptation of feasible, low-cost strategies for low- and middle-income settings. Further studies in Indonesian primary care and community health settings are also warranted to generate context-specific evidence on the feasibility, acceptability, implementation, and outcomes of behavioural and self-management interventions for hypertension.

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