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RESPONSE TO LETTER

Effectiveness of BHATIN (Behavior-Tailored Intervention) for Self-Care Management and Clinical Biomarkers Among Patients with Hypertension: A Quasi Experimental Study [Response to Letter]

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Dear editor

We thank Supriadi B., Nurfatimah Nurfatimah, and Kadar Ramadhan for their thoughtful interest in our article and welcome the opportunity to clarify several methodological and reporting points related to the BHATIN study.[1]

Regarding the unit of allocation, we wish to clarify that our study was designed as a pragmatic quasi-experimental pretest–posttest study with a non-equivalent control group, rather than as a randomized controlled trial or cluster-randomized trial. The use of two geographically separate villages was a deliberate methodological decision to minimize contamination between the intervention and control groups. This consideration was particularly important because the BHATIN model involved repeated community-based health coaching, family engagement, community health worker participation, self-monitoring, and reinforcement of behavioral change over a 12-week period. If participants from the intervention and control groups had been recruited from the same village, there would have been a substantial risk of information sharing, peer influence, and diffusion of intervention components into the control group.

At the same time, both villages were located within the same primary healthcare center catchment area and were served under the same community non-communicable disease program. Routine hypertension care, including blood pressure monitoring, medication management, and standard lifestyle counselling, was implemented under the same primary healthcare structure and district health authority. Therefore, while some residual village-level contextual variation is inherent in real-world community allocation, both sites shared the same primary care and public health service context. The findings should therefore be interpreted within the scope of a real-world community-based quasi-experimental design.

We also welcome the opportunity to clarify the rationale for the baseline reporting and analytical approach used in our pragmatic quasi-experimental design. Baseline characteristics were reported transparently to describe the initial profile of participants in the intervention and control groups and to allow readers to evaluate the study context. The term "generally comparable" was used descriptively, within the scope of a non-randomized quasi-experimental study, and was not intended to imply equivalence in the same manner as would be expected from random allocation.

The analytical approach used in the published article was selected to address the study objectives, namely to examine changes from pretest to posttest within each group and to compare outcomes between groups after the 12-week implementation of the BHATIN model. This approach was applied within the context of a real-world community-based intervention, where the separation of villages was used to reduce contamination between intervention and control participants. Both villages

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were located within the same primary healthcare center catchment area and received routine hypertension care under the same community non-communicable disease program, which provided a shared service context for implementation.

Regression-based or baseline-adjusted approaches may further improve precision in future confirmatory evaluations of BHATIN, particularly in studies involving randomization, multiple villages per arm, or larger cluster structures. However, the findings of the present study should be interpreted according to its original design and purpose: as pragmatic evidence supporting the potential effectiveness and feasibility of a culturally tailored, nurse-led, community-based intervention for hypertension self-care, rather than as evidence from a randomized or cluster-randomized trial.

Regarding outcome interpretation, the outcomes were selected based on the theoretical pathway underlying the BHATIN model, which was developed as a theory-driven behavioral intervention integrating Theory of Planned Behavior constructs, mindfulness-informed health coaching, self-efficacy enhancement, family support, community health worker involvement, and self-monitoring. Therefore, the outcomes were conceptualized as interconnected components of the proposed behavioral change pathway, rather than as unrelated standalone variables.

Within this framework, psychosocial variables, including attitude, subjective norm, perceived behavioral control, intention, knowledge, and self-efficacy, were included to represent intermediate mechanisms of behavioral change. Hypertension self-care behavior, salt preference, and blood pressure were the central behavioral and clinical outcomes most directly aligned with the objectives of the BHATIN intervention. Anthropometric and metabolic biomarkers were included as supportive clinical indicators to provide a broader description of participants' cardiometabolic profile following the intervention.

Accordingly, the interpretation of the findings was guided by the coherence of changes across theoretically linked domains rather than by isolated statistically significant findings in separate outcomes. The observed pattern of improvement across psychosocial mechanisms, self-care behavior, salt preference, and blood pressure is consistent with the conceptual logic of BHATIN, which aims to strengthen hypertension self-care and support salt-reduction through culturally tailored behavioral coaching and community-based reinforcement. Future confirmatory evaluations of BHATIN may benefit from a more explicit hierarchy of outcomes, including prespecified primary and secondary outcomes and appropriate strategies for interpreting multiple outcome families. In the present study, however, the outcomes should be understood within the scope of a pragmatic quasi-experimental evaluation of a multicomponent community-based behavioral intervention.

Regarding the salt preference inconsistency, we thank the authors for their careful attention to the reported salt preference values and welcome the opportunity to clarify this point. The correct post-intervention salt preference value in the intervention group is 0.097 ± 0.0324, as reported in Table 5. The value of 0.972 reported in Table 6 represents a typographical/decimal-place transcription error in the table.

This discrepancy relates only to the presentation of the value in Table 6 and does not reflect an error in data collection, measurement procedures, statistical analysis, or the direction of the findings. Salt preference was assessed using the graded salt solution test described in the Methods section, and the reported value represents the salt concentration level selected by participants. The correct value of 0.097 ± 0.0324 indicates a reduction in salt preference in the intervention group after the BHATIN intervention.

Importantly, this clarification does not alter the interpretation or conclusion of the study. The reduction in salt preference remains consistent with the conceptual aim of the BHATIN model, namely to support salt-reduction through behavioral tailoring, self-monitoring, health coaching, family support, and community-based reinforcement. We recognize the importance of accurate reporting for transparency and clinical interpretation and will follow the journal's guidance should a formal correction mechanism be required for the value reported in Table 6.

Finally, we thank the authors for highlighting the clinical implications of the methodological points raised in their Letter. We would like to emphasize that the BHATIN model was developed as a theory-driven and culturally tailored community-based nursing intervention designed to strengthen hypertension self-care through health coaching, family support, community health worker involvement, self-monitoring, and reinforcement of salt-reduction behaviors. Therefore, the main contribution of the study lies in providing pragmatic evidence regarding the potential effectiveness and feasibility of implementing BHATIN in a real-world primary care and community setting.

The interpretation of the findings should be aligned with the design and purpose of the study. The study was conducted as a pragmatic quasi-experimental pretest–posttest study with a non-equivalent control group, rather than as a randomized

controlled trial. Accordingly, the findings should be understood within the scope of a real-world community-based intervention study and interpreted in relation to the theoretical pathway of BHATIN across psychosocial, behavioral, and clinical outcomes.

Future confirmatory evaluations of BHATIN may further strengthen the evidence base through individual randomization where feasible, multiple villages per study arm, cluster-randomized or stepped-wedge designs, longer-term follow-up, and analytical approaches that more explicitly account for baseline characteristics and outcome hierarchy. In the present study, however, the findings remain clinically relevant as pragmatic evidence supporting the feasibility and potential effectiveness of a culturally responsive, nurse-led, community-based intervention for hypertension self-care management in primary care settings.

Declaration of Generative Artificial Intelligence

During the preparation of this response letter, the authors used ChatGPT and Paperpal solely to support grammar, clarity, and language expression. These tools were used only for language editing and did not influence the scientific content, interpretation, or conclusions of this communication. The authors take full responsibility for the content of this response letter.

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Reference

1. Usman AM, Kosasih CE, Pramukti I, Sofiatin Y, Pamungkas RA. Effectiveness of BHATIN (Behavior-Tailored Intervention) for self-care management and clinical biomarkers among patients with hypertension: a Quasi Experimental Study. *J Multidiscip Healthc*. 2026;19:598078. doi:10.2147/JMDH.S598078