

Effectiveness and Practicality of Indonesian-Adapted Train-the-Trainer MDD Minds Module in Primary Care: A Community Based Training Implementation and Early Clinical Outcomes Study

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Abstract. Background: Indonesia faces an 85% depression treatment gap, with only 0.27 psychiatrists per 100,000 population. Culturally adapted training for primary care physicians is urgently needed. This study evaluated the training effectiveness and early implementation outcomes of an Indonesian-adapted Train-the-Trainer (TtT) MDD Minds module. **Methods:** This Type 1 mixed-methods implementation study involved 30 primary care physicians who completed centralized TtT training (October–November 2024). Eighteen trained scholars subsequently delivered community training to 125 healthcare workers across 12 provinces (December 2024–February 2025). Patient outcomes were assessed over 3 months among 96 patients (58 with comorbid hypertension) treated by trained providers. No control group was included, consistent with the proof-of-concept design. Knowledge, perceived self-efficacy, practicality, and patient-level outcomes (PHQ-9, MMAS-8, blood pressure) were measured using validated instruments. **Results:** Knowledge scores improved significantly from 67.48% to 93.24% (Cohen's $d=2.87$, $p<0.001$), with sustained perceived self-efficacy at 4-week follow-up (2.3 to 3.7/5). Practicality was rated highly (3.65/4.0). Among patients, mean PHQ-9 decreased by 6.1 points (95% CI: 5.3–6.9, $p<0.001$); 64.6% achieved treatment response. Hypertensive patients showed improved medication adherence (MMAS-8 +1.8, $p<0.001$) and blood pressure control (SBP –14.4 mmHg, $p<0.001$). **Conclusion:** The Indonesian-adapted TtT MDD Minds module demonstrated significant training effectiveness, high practicality, and promising preliminary patient benefits. These proof-of-concept findings support broader dissemination pending Phase III randomized evaluation.

Keywords: Community-Oriented Primary Care; Family Medicine; Major Depressive Disorder; Primary Care Training; Train-The-Trainer



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Key Messages

- The MDD Minds Train-the-Trainer module adapted for Indonesia significantly improved primary care physicians' knowledge (67.48% to 93.24%, $p<0.001$,

Cohen's $d=2.87$) and perceived self-efficacy (2.3 to 3.7 on a 5-point scale) in managing major depressive disorder.

- Promising preliminary evidence suggests that improved provider competency may translate into patient benefits: 96 patients demonstrated clinically significant reductions in depression (6.1-point decrease in PHQ-9, $p<0.001$), although confirmatory trials with a control group are needed.
- Among patients with comorbid hypertension ($n=58$), improved depression management was associated with better medication adherence (1.8-point increase in MMAS-8, $p<0.001$) and blood pressure control (14.4 mmHg decrease in SBP, $p<0.001$), demonstrating the benefits of integrated care.
- A high practicality score (3.65/4.0) and successful tiered training reaching 125 health workers in 12 provinces demonstrate feasibility for broader implementation, with clinical practice transformation evidenced by an increase in screening rates (from 18% to 72%).
- This Type 1 implementation study provides proof of concept for the train-the-trainer approach as a potentially scalable model for addressing mental health treatment gaps in resource-limited settings, warranting further Phase III evaluation.

1. Introduction

Mental disorders, particularly major depressive disorder (MDD), are a significant public health challenge globally and particularly in Indonesia. According to the World Health Organization, depression affects more than 280 million people worldwide and is a leading cause of disability [1]. In Indonesia, the prevalence of emotional mental disorders, including symptoms of depression and anxiety, reaches 6.1% among the population aged 15 years and above, with significant regional variations ranging from 1.2% to 12.3% [2]. Despite this significant burden, Indonesia faces a critical treatment gap of approximately 85%, meaning only 15% of cases are adequately diagnosed and receive appropriate treatment [3],[4].

Primary healthcare plays a frontline role in providing mental healthcare services, yet primary healthcare clinicians in Indonesia face numerous challenges in detecting and managing MDD. These challenges include limited formal training in mental disorders (78% of general practitioners report having never received formal training in the diagnosis and management of depression), persistent cultural stigma surrounding mental illness, inadequate integration of screening tools into routine practice, and a significant shortage of mental health specialists, with a psychiatrist ratio of only 0.27 per 100,000, well below the WHO standard of 1 per 100,000 [5],[6].

The family medicine approach in primary care emphasizes comprehensive, continuous, and coordinated care that addresses not only the individual patient but also their family and community. This approach aligns with mental health service delivery, as depression often impacts family dynamics and requires community-level interventions for effective prevention and management [7]. It is important to note that depression in primary care often co-occurs with chronic medical conditions. One of the most common is hypertension, with bidirectional evidence suggesting that depression increases the risk of hypertension through hypothalamic-pituitary-adrenal (HPA) axis dysregulation, sympathetic nervous system activation, and chronic physiological stress responses. While poorly controlled hypertension can contribute to depressive symptoms through reduced quality of life and effects on target organs [32],[33].

In Indonesian primary care settings, where somatization rates among depressed patients reach 40–60%, blood pressure serves as an objective physiological marker reflecting the systemic burden of uncontrolled depression and the quality of holistic care provided [34]. This pattern of comorbidity underscores why family medicine-oriented depression management must extend beyond psychiatric symptoms to include monitoring of cardiovascular and overall physiological well-being. The principles of family medicine primary care include: patient-centered care that respects individual preferences and values; family-oriented medical care that recognizes the influence of the family on health; community-oriented primary care that addresses the health needs of the population; and comprehensive primary care patient management encompassing prevention, diagnosis, treatment, and rehabilitation [8],[9].

To address capacity gaps in depression management, the World Organization of Family Physicians (WONCA) Mental Health Working Group developed the MDD Minds training module. The core components of MDD Minds 101 provide structured training in depression screening, clinical assessment, diagnostic reasoning, basic pharmacological management, and brief psychosocial interventions appropriate for primary care settings. The module is intentionally aligned with the principles of family medicine, emphasizing patient-centered communication, continuity of care, collaborative decision-making, and the integration of mental health management into routine primary care practice. The training-of-trainers (TtT) approach is designed to create a multiplier effect, enabling trained physicians to disseminate these competencies to colleagues and other healthcare workers in their local communities [10].

Recognizing the importance of cultural adaptation in mental health interventions, we adapted the MDD Minds TtT module to the Indonesian context through systematic translation, cultural contextualization, and validation by an expert panel. The adaptation process considered Indonesian expressions of emotional grief,

incorporated more acceptable local terminology rather than stigmatized ones, integrated a spiritual-religious dimension important to 78% of the Indonesian population, and aligned the content with the structure of the Indonesian primary health care system [11],[12].

Although previous studies conducted in the Indonesian primary health care context have evaluated the validity and reliability of the adapted module, demonstrating strong psychometric properties (Cronbach's alpha 0.89, Content Validity Index 0.94), questions remain regarding its training effectiveness, real-world implementation in diverse community settings, and, most importantly, whether improved provider competency will result in measurable benefits for patients [13]. Understanding how the module functions when scholars implement it in their own communities, how the training impacts early patient outcomes, how well it integrates family medicine principles, and what barriers and facilitators might benefit scale-up is crucial for potential national adoption.

This study aimed to evaluate the training effectiveness and initial implementation outcomes of the TtT MDD Minds module adapted for Indonesia through community-based implementation with initial patient-level outcome assessments. As a Type 1 implementation study, this study focused on feasibility, acceptability, and learning outcomes while providing proof of concept for patient benefit. Specifically, we examined improvements in knowledge and clinical reasoning among trained clinicians, assessed the perceived practicality of the module for community implementation, evaluated initial clinical outcomes among patients cared for by trained health workers, measured clinical practice transformation, evaluated the integration of family medicine primary care principles into training delivery, and identified several factors influencing the success of tiered community-level training.

The novelty of this study lies in its focus on the real-world implementation of locally adapted training in the Indonesian context, documenting the initial translational pathway from provider training to initial patient benefits, and systematically evaluating how family medicine principles were integrated into community-level mental health capacity building.

2. Materials and Methods

Study Design and Ethics

This study used a mixed-methods design combining quantitative evaluation of training effectiveness with prospective assessment of early patient clinical outcomes. It was configured as a Type 1 implementation study focusing on feasibility, acceptability, and learning outcomes. The study was conducted in three interrelated phases: Phase 1 consisted of a centralized TtT training program (October-November 2024), Phase 2 involved community implementation by trained undergraduates (December 2024-February 2025), and Phase 3 consisted of a 3-month evaluation of

early patient outcomes (December 2024–March 2025) as proof of concept for clinical translation.

This study did not include a control or comparison group. This design was intentional and consistent with the objectives of a Type 1 implementation study, which prioritizes feasibility, acceptability, and proof of concept over causal efficacy testing. Including a concurrent control group was not feasible given the community-based, cascade delivery model, wherein scholars self-selected whether to implement training in their local settings and patients were recruited opportunistically from trained providers' caseloads. Pre-post comparisons were used as the primary analytical approach for both provider knowledge and patient outcomes. While this limits causal inference—particularly for patient-level findings—the large effect sizes observed across multiple outcome domains, the biological plausibility of the associations, and consistency with prior controlled trials in similar settings collectively support the validity of these preliminary findings. The absence of a control group is explicitly acknowledged as a primary limitation, and a Phase III randomized controlled trial is recommended as the essential next step.

This study received ethics approval from the Research Ethics Committee of the Faculty of Medicine, Pelita Harapan University (approval number: 094/K-LKJ/ETIK/II/2024). All participants (both healthcare providers and patients) provided written electronic consent prior to participating in any study activities. This study was conducted in accordance with the Declaration of Helsinki and Indonesian research ethics guidelines.

Population and Sampling

The study involved three distinct participant groups across a tiered TtT implementation structure.

Group 1 – TtT Participants (n=30). Primary care physicians recruited online via professional associations (IDI, PDKI) and WhatsApp/Telegram professional networks, representing Java, Sumatra, and Sulawesi. Inclusion criteria: active medical practice license; current primary care employment; completion of the MDD Minds 101 prerequisite course; stable internet access; and willingness to participate in all study components (pre-test, training, post-test, 4-week follow-up). Exclusion criteria: psychiatric specialization; inability to complete the program; or withdrawal of consent. A minimum sample of 30 was calculated to detect a medium effect size (Cohen's $d=0.5$) with 80% power ($\alpha=0.05$), consistent with instrument validation requirements [14].

Group 2 – Community Healthcare Workers (n=125). Healthcare workers (85 doctors, 26 nurses, 14 midwives) trained by TtT graduates ("scholars") in their local settings during the community implementation phase (December 2024–February 2025). No formal inclusion/exclusion criteria or individual outcome data were

applied to this group; they are reported in terms of cascade reach and geographic distribution only.

Group 3 – Patients (n=96). Patients presenting to scholars' facilities during routine visits over 3 months (December 2024–March 2025). Inclusion criteria: aged ≥ 18 years; PHQ-9 ≥ 10 ; no active suicidal ideation requiring immediate referral; and written informed consent. All 96 completed baseline and 3-month follow-up assessments; 58 had comorbid hypertension and were additionally assessed for medication adherence (MMAS-8) and blood pressure control. Post-hoc power analysis confirmed that n=96 provided 0.95 power to detect a medium effect size and >0.99 power for a large effect size (G*Power 3.1).

Variables and Measurement

The MDD Minds TtT module adapted for Indonesia consists of four structured 120-minute training sessions covering: Introduction to Depression (epidemiology, diagnostic criteria, clinical manifestations, comorbidities); Screening and Assessment (validated screening tools including the PHQ-9, GAD-7, MINI; clinical interview techniques; suicide risk assessment); Treatment Planning (evidence-based treatment options, collaborative care approaches, shared decision-making); Pharmacological Management (antidepressants for primary care, managing side effects, monitoring and follow-up); Psychosocial Interventions (brief psychological interventions, behavioral activation techniques, problem-solving therapy); and Train the Trainer Skills (adult learning principles, training delivery techniques, program evaluation methods).

Each session incorporates a variety of teaching methods, including didactic presentations, interactive case discussions, role-playing exercises, small group work, and practical skills demonstrations. All materials are delivered in Bahasa Indonesia, with case scenarios, terminology, and examples that are culturally adapted and relevant to the Indonesian primary care context.

Several validated instruments were used for data collection:

Pre-Post Knowledge Assessment: A 20-item questionnaire consisting of 15 items assessing knowledge about the diagnosis and management of depression and 5 items assessing clinical reasoning and decision-making through written case studies. This assessment was administered immediately before the first training session and immediately after the last session.

Perceived Practicality Evaluation Questionnaire: A structured questionnaire with 5 domains rated on a 4-point Likert scale (1=strongly disagree to 4=strongly agree) that measured participants' perceptions of: ease of use of the materials, time efficiency of the training, accessibility of tools and resources, ease of implementation in field practice, and suitability for training other healthcare workers. This questionnaire demonstrated good internal consistency (Cronbach's alpha 0.87) during

pilot testing. Practicality refers to perceived practicality – participants' subjective assessment of the usefulness of the adapted module in the Indonesian primary care context.

Effectiveness Evaluation Questionnaire: A 5-item instrument assessing: perceived knowledge improvement, improved clinical reasoning, confidence in MDD management, ability to apply learning in practice, and capacity to train others. Responses were on a 4-point Likert scale.

Perceived Self-Efficacy Scale: A 5-point, single-item scale (1=very low to 5=very high) measuring perceived clinical confidence in managing depression cases. It was administered at baseline, immediately after training, and at the 4-week follow-up. This measure captures subjective self-assessment rather than the complete psychological construct of self-efficacy.

Community Implementation Report: A standardized reporting format completed by scholars documenting the number and type of healthcare workers trained, the location and setting of the community sessions, adaptations made to the training materials, challenges encountered, and the integration of family medicine principles (patient-centered care, family-oriented care, community-oriented approaches, comprehensive patient management).

Qualitative Feedback Form: Open-ended questions that capture participants' experiences, suggestions for improvement, and perceptions of the relevance of the training to practice.

Patient Clinical Outcome Measurement: For the patient outcome evaluation phase, the following validated instruments were used:

PHQ-9 (Patient Health Questionnaire-9): A 9-item self-report questionnaire that assesses the severity of depression over the past 2 weeks. Scores range from 0-27, with interpretations: 0-4 (minimal/none), 5-9 (mild), 10-14 (moderate), 15-19 (moderately severe), 20-27 (severe). A decrease of ≥ 5 points indicates clinically meaningful improvement and treatment response. Remission is defined as a PHQ-9 score < 5 . The PHQ-9 has been validated in Indonesian populations with good reliability (Cronbach's alpha 0.81).

Morisky Medication Adherence Scale-8 (MMAS-8): A validated 8-item instrument that measures medication-taking behavior. Scores range from 0-8, with interpretations: < 6 (low adherence), 6-7 (moderate adherence), and 8 (high adherence). Higher scores indicate better adherence to prescribed medications. The MMAS-8 has demonstrated validity in a chronic disease population in Indonesia.

Blood Pressure Measurement: Systolic and diastolic blood pressure (SBP/DBP) were measured in mmHg using a standardized protocol with a calibrated sphygmomanometer after a 5-minute rest in a seated position. Two measurements were taken 5 minutes apart and averaged. Target control was defined as BP $< 140/90$ mmHg for patients with hypertension. Blood pressure was selected as the outcome

parameter based on: (1) the high comorbidity between depression and hypertension in Indonesian primary healthcare settings, (2) the common manifestation of somatic symptoms in the presentation of depression, (3) its usefulness as an objective physiological proxy for monitoring response to mental health interventions, and (4) its reflection of the quality of holistic integrated care, where improved depression management can improve medication adherence and stress management, thereby improving blood pressure control.

Clinical Practice Indicators: Process measures extracted from medical records included the percentage of eligible patients screened for depression using the PHQ-9, the percentage of patients with a scheduled follow-up appointment within 4 weeks, and the percentage of patients receiving psychosocial education and counseling.

Data Analysis

Data were analyzed using IBM SPSS Statistics Version 28.0. The analysis strategy included:

Descriptive Statistics: Participant characteristics were summarized using frequencies and percentages for categorical variables (gender, practice environment, geographic location) and means with standard deviations for continuous variables (age, years of practice). Normality of distribution was assessed using the Shapiro-Wilk test and visual inspection of histograms.

Effectiveness Analysis: Paired t-tests compared pre-test and post-test knowledge scores for normally distributed data. Effect sizes were calculated using Cohen's d with interpretations of 0.2 (small), 0.5 (moderate), and 0.8 (large). Changes in self-efficacy scores were analyzed using repeated-measures ANOVA across three time points (baseline, post-training, and follow-up). Subgroup analyses examined differences based on participant characteristics (urban vs. rural, years of experience) using independent t-tests or ANOVA as appropriate.

Practicality Analysis: Mean scores and standard deviations were calculated for each practicality domain. The proportion of respondents who rated each domain as practical (score ≥ 3) was determined. Internal consistency of the practicality scale was confirmed using Cronbach's alpha.

Community Implementation Analysis: Descriptive statistics summarized the number of scholars conducting community sessions, health workers reached (by type), geographic distribution, and reported integration of family medicine principles. Success factors and barriers were identified through content analysis of implementation reports.

Qualitative Data Analysis: Thematic analysis of open-ended responses identified recurring themes related to training experiences, perceived impacts, challenges, and suggestions for improvement. Two independent coders analyzed the

qualitative data, with interrater reliability assessed using Cohen's kappa ($\kappa=0.84$, indicating good agreement).

Statistical significance was set at $p<0.05$ for all analyses. Missing data were minimal (<3%) and handled using listwise deletion for pairwise analyses. Confidence intervals (95% CI) are reported for all primary outcomes.

Potential confounders at the provider level—including years of practice experience, practice setting (urban vs. rural), and facility type—were examined through pre-specified subgroup analyses using independent samples t-tests and one-way ANOVA. Prior training in mental health was an exclusion criterion (any physician with psychiatric specialization was excluded), which reduced but did not eliminate the possibility of differential baseline familiarity with depression management. Because the primary training outcome (knowledge gain) was assessed using a within-subject pre-post design, each participant served as their own control, partially mitigating the influence of stable individual-level confounders. For patient-level outcomes, potential confounders such as baseline depression severity, comorbidity burden, and adherence to pharmacotherapy versus psychosocial interventions were not systematically controlled due to the observational, proof-of-concept nature of this phase. Ninety-five percent confidence intervals are reported for all primary outcome estimates.

3. Results and Discussion

Participant Characteristics

A total of 30 primary care physicians participated in the center's Train-the-Trainer program. The mean age was 34.8 years ($SD=6.2$, range 28-52 years). The majority of participants were female (63.3%, $n=19$) and had been practicing for an average of 7.4 years ($SD=4.8$, range 2-18 years). Participants were spread across urban (60%, $n=18$) and rural (40%, $n=12$) practice settings. Geographically, participants represented a diverse range of regions including Java (50%, $n=15$), Sumatra (30%, $n=9$), Sulawesi (13.3%, $n=4$), and other islands (6.7%, $n=2$). Most participants worked in community health centers (53.3%, $n=16$), while others worked in private clinics (33.3%, $n=10$) or family medicine practices (13.3%, $n=4$). All participants completed the MDD Minds 101 online course as a prerequisite [Table 1](#).

Table 1. Demographic and Professional Characteristics of Train-the-Trainer Participants ($N=30$)

Characteristic	n	%
Gender		

Male	11	36.7
Female	19	63.3
Age Group (years)		
25-30	8	26.7
31-35	12	40.0
36-40	6	20.0
>40	4	13.3
Years in Practice		
<5 years	10	33.3
5-10 years	14	46.7
>10 years	6	20.0
Practice Setting		
Urban	18	60.0
Rural	12	40.0
Geographic Location		
Java	15	50.0
Sumatra	9	30.0
Sulawesi	4	13.3
Other Islands	2	6.7

Type of Facility		
Community Health Center (Puskesmas)	16	53.3
Private Clinic	10	33.3
Family Practice	4	13.3

Training Participation and Completion

All four training sessions were successfully completed with high levels of participation. Attendance ranged from 21 to 30 participants per session, with an average attendance rate of 88.3% (SD=5.7%). Although the weekend scheduling created some conflicts with participants' personal commitments, overall engagement remained high. All 30 participants completed the pre-and post-test assessments, resulting in a 100% completion rate for the main training program.

Effectiveness of the Training Module

The training module produced significant improvements across all measured provider outcomes. Knowledge scores increased by 25.76 percentage points (from 67.48% to 93.24%, 95% CI for difference: 22.89–28.63; $t(29)=18.47$, $p<0.001$, Cohen's $d=2.87$), representing a large effect size and a 38.2% relative gain from baseline. Clinical reasoning performance, assessed via written case vignettes, improved from 56% to 92% correct responses (Cohen's $d=2.38$, $p<0.001$). Perceived self-efficacy rose from 2.3 at baseline to 3.8 immediately post-training and was sustained at 3.7 at 4-week follow-up ($p<0.001$ vs. baseline; post-training vs. follow-up: $p=0.412$). Perceived practicality was rated 3.65 out of 4.0 overall. At the patient level, PHQ-9 scores decreased by a mean of 6.1 points (95% CI: 5.3–6.9, $p<0.001$), exceeding the minimal clinically important difference of 5 points; 64.6% achieved treatment response and 21.9% achieved remission at 3 months.

Knowledge Improvement

The mean pre-test knowledge score was 67.48% (SD=8.23, range 52–82%), while the post-test score increased significantly to 93.24% (SD=4.67, range 82–100%). A paired t-test showed this difference to be highly statistically significant ($t(29)=18.47$, $p<0.001$). The effect size was large (Cohen's $d=2.87$), indicating substantial practical significance. The mean increase in knowledge score was 25.76 percentage points (95% CI: 22.89–28.63), representing a relative increase of 38.2% from baseline. All participants (100%) showed an increase in knowledge score, with 26 participants (86.7%) achieving a post-test score above 90%.

Clinical Reasoning and Decision Making Assessment

The clinical reasoning and decision-making components, assessed through five case-based scenarios, showed a similar pattern of improvement. Before training, participants correctly answered an average of 2.8 out of 5 scenarios (56%, SD=0.9). Post-training performance increased to 4.6 out of 5 scenarios (92%, SD=0.5), indicating a significant improvement ($t(29)=12.34$, $p<0.001$, Cohen's $d=2.38$). This indicates that participants not only gained theoretical knowledge but also developed practical competence in applying depression management skills to realistic clinical situations.

Perceived Self-Efficacy Changes

Perceived self-efficacy in managing depression cases was measured on a 5-point scale at three time points: before training (baseline), immediately after training, and at a 4-week follow-up after community implementation. A repeated-measures ANOVA revealed significant changes across time points ($F(2,56)=87.43$, $p<0.001$, partial $\eta^2=0.76$). The mean self-efficacy score increased from 2.3 at baseline (SD=0.6) to 3.8 immediately after training (SD=0.5), and was maintained at 3.7 at follow-up (SD=0.6). Pairwise comparisons revealed significant differences between baseline and after training ($p<0.001$), baseline and follow-up ($p<0.001$), but no significant difference between after training and follow-up ($p=0.412$), indicating sustained improvement in self-efficacy.

Table 2. Subgroup Analysis of Knowledge Gains by Participant Characteristics (N=30)

Time Point	Mean (SD)	95% CI	p-value*
Baseline	2.3 (0.6)	2.1-2.5	-
Post-training	3.8 (0.5)	3.6-4.0	<0.001
4-week Follow-up	3.7 (0.6)	3.5-3.9	<0.001**

*Compared to baseline; **Compared to baseline (post-training vs follow-up: $p=0.412$)

Subgroup Analysis

Subgroup analyses were conducted to examine whether training effectiveness varied by participant characteristics. No significant difference in knowledge gain was found between urban and rural practitioners (mean post-test scores 93.8% vs. 92.4%; $t(28)=1.23$, $p=0.228$), indicating consistent effectiveness across practice settings. Years of experience did not significantly predict knowledge gain ($F(2,27)=0.89$, $p=0.421$).

Participants in community health centers (Puskesmas) achieved slightly higher post-test scores (94.2%, SD=4.1%) compared to those in private practice (91.8%, SD=5.2%), though this difference did not reach statistical significance ($t(28)=1.47$, $p=0.152$). These subgroup results are summarized in [Table 2](#). No subgroup analyses were conducted for patient-level outcomes, given the opportunistic sample size and absence of a control group.

Perceived Practicality of the Module

Participants rated the module highly on all practicality dimensions using a 4-point Likert scale.

Table 3. Perceived Practicality Assessment of the Training Module (N=30)

Perceived Practicality Dimension	Mean (SD)	% Rating Practical (≥ 3)
Ease of use of materials	3.68 (0.42)	93.3
Time efficiency of training	3.72 (0.38)	96.7
Accessibility of tools and resources	3.61 (0.49)	90.0
Ease of implementation in practice	3.65 (0.45)	90.0
Suitability for training others	3.58 (0.51)	86.7
Overall Perceived Practicality Score	3.65 (0.42)	91.3

The overall mean perceived practicality score of 3.65 out of 4.0 (SD=0.42) indicated that participants found the module highly practical in [Table 3](#). Over 90% of participants rated the module as practical (score ≥ 3) across most dimensions. Time efficiency received the highest rating (mean=3.72), while suitability for training others received the lowest, though still high, rating (mean=3.58). The internal consistency of the practicality scale was excellent (Cronbach's alpha=0.89).

Community Implementation Outcomes

Reach and Coverage

Of the 30 TtT participants, 18 scholars (60%) successfully conducted community training sessions in their respective practice areas. These 18 scholars reached a total of 125 healthcare workers across Indonesia. The distribution of trained

healthcare workers was as follows: 85 doctors (68%), 26 nurses (20.8%), and 14 midwives (11.2%).

Table 4. Community Training Sessions Conducted by Scholars

No	Scholar Name	Location	Sessions	Physicians	Nurses	Midwives	Total
1	YT	Garut, West Java	5	5	0	0	5
2	GM	Central Java	10	10	3	3	16
3	HS	Jakarta	2	2	2	0	4
4	AN	North Sumatra	5	5	0	0	5
5	SH	East Java	3	3	2	1	6
6	IF	West Java	3	3	3	2	8
7	GD	Yogyakarta	5	5	0	0	5
8	AU	Lampung	3	3	2	1	6
9	H	South Sulawesi	5	5	0	0	5
10	FN	Banten	3	3	2	1	6
11-18	Other scholars	Various	35	41	12	6	59
Total			79	85	26	14	125

The geographic distribution of community sessions spanned 12 provinces, demonstrating a broad reach across the Indonesian archipelago in [Table 4](#). The number of sessions per scholar ranged from 2 to 10 (mean=4.4, SD=2.3), with the number of trainees per scholar ranging from 4 to 16 (mean=6.9, SD=3.7). Urban areas accounted for 55% of implementation locations, while 45% occurred in rural or semi-rural areas.

Factors Associated with Community Implementation

Among the 12 scholars (40%) who did not conduct community sessions, reported barriers included: scheduling conflicts and time constraints (n=5, 41.7%), lack of institutional support or permission (n=3, 25%), difficulty organizing participants (n=2, 16.7%), and personal or family health issues (n=2, 16.7%). Scholars who successfully conducted community training were more likely to work in a community health center (72.2% vs. 41.7%, $p=0.041$) and have longer practice experience (mean 8.6 years vs. 5.8 years, $p=0.032$).

Customization and Local Adaptation

Scholars demonstrated creativity and cultural sensitivity in adapting training to their local contexts. Common adaptations included: translating medical terminology into local languages or dialects (61%), incorporating local expressions of emotional distress (72%), using case scenarios based on local patient populations (100%), adjusting training duration to fit local schedules (44%), and integrating traditional healing practices into discussions (33%). These adaptations increased the relevance and acceptability of the training across diverse Indonesian settings.

Effectiveness Evaluation by Participants

Participants rated various aspects of training effectiveness on a 4-point Likert scale.

Table 5. Effectiveness Evaluation Ratings (N=30)

Effectiveness Domain	Mean (SD)	% Rating Effective (≥ 3)
Increased knowledge on MDD detection and management	3.83 (0.38)	100.0
Improved practical skills in handling depression	3.77 (0.43)	96.7
Enhanced confidence in managing MDD cases	3.70 (0.47)	93.3
Ability to apply learning in daily practice	3.67 (0.48)	90.0
Capacity to train other healthcare workers	3.53 (0.57)	86.7
Overall Effectiveness Score	3.70 (0.42)	93.3

All participants (100%) reported increased knowledge in detecting and managing MDD, with a mean score of 3.83 in [Table 5](#). Capacity to train others received the lowest score (mean = 3.53), although it still demonstrated strong effectiveness, suggesting that this may be an area for further improvement in future iterations.

Participant Satisfaction and Recommendations

Overall satisfaction with the module was high, with a mean score of 3.76 out of 4.0 (SD=0.43). When asked about recommending the training to colleagues, 96.7% (n=29) strongly agreed or agreed that they would recommend it. All 30 participants (100%) indicated a willingness to use the knowledge and skills in their practice. Regarding future participation, 28 participants (93.3%) expressed interest in further training or refresher courses.

Qualitative Findings

Thematic analysis of the open-ended responses, coded independently by two scholars (inter-rater reliability $\kappa=0.84$), identified five major themes. These themes and representative participant statements are summarized in [Table 6](#).

Table 6. Themes Identified from Qualitative Feedback (N=30)

Theme	Description	Illustrative Quote
Enhanced Clinical Confidence	Participants reported increased confidence in screening and managing depression cases in primary care	"The training improved my confidence in MDD management" (Participant, Bandung)
Value of Interactive Learning	Roleplays and case-based discussions were reported as particularly useful components of the training	"Interactive roleplays and feedback sessions were very valuable" (Participant, Palembang)
Relevance of Local Adaptation	Participants noted that culturally and contextually adapted materials were more applicable to their practice settings	"The local adaptation of materials made it more relevant to my practice" (Participant, Garut)
Challenges in Implementation	Barriers to community session delivery included time constraints, limited institutional support, restricted antidepressant availability, and patient-side stigma	"It was difficult to find a time slot that worked for both me and my colleagues at the clinic" (Participant, Rural East Java)

Theme	Description	Illustrative Quote
Sustainability and Cascade Effect	Scholars who conducted community sessions reported that teaching others reinforced their own learning	"Training my colleagues was rewarding and helped reinforce my own learning" (Participant, Central Java)

These themes collectively reflect the experiences participants reported across the training and implementation phases. Further interpretation of these findings in relation to family medicine principles and module design is discussed in the Discussion section.

Suggestions for Improvement

Participants provided constructive suggestions: including more local case studies that reflect regional variations (n=12), extending the training duration or adding reinforcement sessions (n=8), providing more support for obtaining CME accreditation (n=15), developing simplified materials for training non-physician health workers (n=7), and establishing a formal mentoring or consultation system for complex cases (n=10).

Preliminary Clinical Implementation Outcomes

Following the community training session, 18 scholars applied the skills learned directly in their respective primary care settings over a 3-month period. Initial clinical outcomes were evaluated to provide proof of concept for the potential application of the training for patient benefit.

Patient Recruitment and Assessment

Trained health workers systematically screened patients presenting to their facilities during routine visits. A total of 96 patients were diagnosed with depression and enrolled for treatment and follow-up. Among them, 58 had comorbid hypertension. All patients received depression management according to the training protocol, including pharmacological treatment if needed, brief psychosocial interventions, and regular follow-up. The initial assessment was conducted at the time of initial diagnosis, with a follow-up evaluation 3 months after implementation.

Clinical Outcome Measures

Several validated instruments are used to assess patient outcomes and practice transformation:

PHQ-9 (Patient Health Questionnaire-9): A 9-item self-report questionnaire that assesses the severity of depression over the past 2 weeks. Scores range from 0-27,

with interpretations as follows: 0-4 (minimal/none), 5-9 (mild), 10-14 (moderate), 15-19 (moderately severe), 20-27 (severe). A decrease of ≥ 5 points indicates clinically meaningful improvement and treatment response.

Morisky Medication Adherence Scale-8 (MMAS-8): A validated, 8-item instrument that measures medication-taking behavior. Scores range from 0-8, with interpretations as follows: <6 (low adherence), 6-7 (moderate adherence), and 8 (high adherence). Higher scores indicate better adherence to prescribed medications.

Blood Pressure Measurement: Systolic and diastolic blood pressure (SBP/DBP) are measured in mmHg using a standardized protocol. Target control is defined as blood pressure $<140/90$ mmHg for patients with hypertension.

Clinical Practice Indicators: Process measures including frequency of depression screening, scheduled follow-up appointments, and provision of psychosocial education, were extracted from medical records in [Table 7](#).

Table 7. Preliminary Clinical Implementation Outcomes Following Community Training

Outcome Indicator	Baseline (Pre-implementation)	3 Months Post-implementation	Mean Change	p-value	Interpretation
Depression Severity (n=96 patients)					
PHQ-9 score, mean (SD)	14.2 (3.1)	8.1 (3.4)	↓ 6.1 points	<0.001	Clinically significant improvement
Depression severity category	Moderate	Mild	-	-	Category shift
Patients achieving ≥ 5 -point PHQ-9 reduction	-	62 (64.6%)	-	-	Treatment response

Outcome Indicator	Baseline (Pre-implementation)	3 Months Post-implementation	Mean Change	p-value	Interpretation
Remission (PHQ-9 <5)	0 (0%)	21 (21.9%)	+21.9%	-	Early remission achieved
Medication Adherence (n=58 hypertensive patients)					
MMAS-8 score, mean (SD)	5.3 (1.4)	7.1 (0.9)	↑ 1.8 points	<0.001	Improved adherence
Adherence category	Low adherence	High adherence	-	-	Behavioral change
Patients with high adherence (MMAS-8 ≥6)	17 (29.3%)	43 (74.1%)	+44.8%	<0.001	Meaningful improvement
Blood Pressure Control (n=58 patients)					
Mean systolic BP (mmHg), mean (SD)	148.6 (12.4)	134.2 (10.1)	↓ 14.4 mmHg	<0.001	Better control BP
Mean diastolic BP (mmHg), mean (SD)	92.4 (8.6)	84.1 (7.2)	↓ 8.3 mmHg	<0.001	Improved control

Outcome Indicator	Baseline (Pre-implementation)	3 Months Post-implementation	Mean Change	p-value	Interpretation
Patients achieving BP <140/90	18 (31.0%)	39 (67.2%)	+36.2%	<0.001	Integrated care effect
Clinical Practice Transformation					
Routine depression screening rate	18% of visits	72% of visits	+54%	<0.001	Practice transformation
Scheduled follow-up within 4 weeks	24%	69%	+45%	<0.001	Improved continuity
Provision of psychosocial education	31%	84%	+53%	<0.001	Enhanced care quality

Clinical Significance of Findings

Depression Improvement: The mean PHQ-9 reduction of 6.1 points (95% CI: 5.3-6.9) exceeded the minimal clinically important difference threshold of 5 points, indicating a significant clinical benefit. The shift from moderate depression (mean baseline 14.2) to mild depression (mean 8.1 after 3 months) demonstrated meaningful functional improvement for patients. Of note, 64.6% of patients achieved a treatment response (decrease of ≥ 5 points), comparable to outcomes reported in specialist psychiatric settings. The remission rate of 21.9% (PHQ-9 < 5) at 3 months, while modest, is encouraging given the primary care context and represents patients achieving symptom resolution.

Improved Medication Adherence: The improvement in MMAS-8 scores from 5.3 (low adherence) to 7.1 (high adherence) indicates that trained healthcare providers successfully addressed barriers to adherence through patient education and counseling. The 44.8 percentage point increase in patients with high adherence (from 29.3% to 74.1%) has important implications for the management of comorbid chronic conditions. This improvement likely resulted from the integrated care approach

taught in the training, where healthcare workers learned to address depression and chronic disease management simultaneously.

Blood Pressure Control: Among patients with comorbid hypertension and depression, a 14.4 mmHg reduction in systolic blood pressure and an 8.3 mmHg reduction in diastolic blood pressure demonstrated clinically significant improvements. The increase in the number of patients achieving blood pressure control from 31.0% to 67.2% demonstrates the interconnected nature of mental and physical health. Depression treatment likely improves medication adherence, health behaviors, and stress management, all of which contribute to better hypertension control. These findings support the integrated care model promoted in the training.

Practice Transformation: Substantial increases in depression screening rates (18% to 72%), scheduled follow-up (24% to 69%), and provision of psychosocial education (31% to 84%) demonstrate a marked transformation in clinical practice patterns. These process improvements demonstrate that the training successfully changed healthcare workers' behavior, not just their knowledge. High screening rates indicate that depression detection is becoming more routine rather than sporadic, addressing the ongoing problem of under-detection in Indonesia's primary healthcare services.

Discussion

This Type 1 implementation study evaluated the training effectiveness and initial implementation outcomes of the MDD Minds Train-the-Trainer module adapted for Indonesia through community-based implementation, with particular attention to the integration of family medicine primary care principles and initial assessment of benefits at the patient level. Our findings demonstrated significant improvements in provider knowledge and clinical reasoning, high practicality ratings, successful community-level training, and promising preliminary evidence indicating potential translation to patient outcomes. These results provide proof of concept supporting the feasibility and acceptability of this intervention to potentially address substantial mental health treatment gaps in Indonesia, although a confirmatory Phase III trial with a larger sample size and control group is needed to establish definitive clinical effectiveness.

Training Effectiveness

The substantial increase in knowledge scores from 67.48% pre-training to 93.24% post-training, with a large effect size (Cohen's $d=2.87$), demonstrates the module's effectiveness in improving theoretical understanding of depression management. This magnitude of improvement is comparable to similar training interventions in other low- and middle-income countries. A randomized controlled trial of depression training for general practitioners in Australia reported a knowledge

increase from 42% to 76%, while our study achieved higher post-training scores [15]. Similarly, a quasi-experimental study in Kenya showed a 45% increase in knowledge scores, compared with our relative increase of 38.2% [16]. This comparison suggests that the module adapted for Indonesia demonstrates training effectiveness at least comparable to international counterparts.

The improvement in clinical reasoning and decision-making, as assessed through written case studies (from 56% to 92% correct responses), indicates that participants not only gained theoretical knowledge but also developed competence in applying depression management concepts to realistic clinical situations. Although this assessment method does not capture actual clinical performance with real patients, it provides evidence of improvements in cognitive skills important for depression treatment.

The persistence of perceived self-efficacy at the 4-week follow-up (3.7 vs. 3.8 immediately after training, $p=0.412$) indicates that the increased confidence was maintained beyond the immediate training period. This persistence is important, as previous research has established self-efficacy as a predictor of clinical behavior change following training interventions [17]. The increase from baseline (2.3) to follow-up (3.7) represents a 61% increase in perceived confidence. However, it is important to note that this measure represents a subjective self-assessment rather than the complete psychological construct of self-efficacy, and actual clinical competence requires objective evaluation.

Importantly, the training was equally effective in urban and rural settings and across varying levels of practice experience. This consistency indicates that the module is robust and adaptable to diverse contexts, an important characteristic for potential national implementation in a geographically and culturally diverse country like Indonesia.

Practicality and Implementability

The high practicality rating (overall mean 3.65/4.0) indicates that the module is user-friendly and feasible for implementation in real-world primary care settings. Time efficiency received the highest rating (3.72), indicating that the 120-minute session format is appropriate and sustainable for busy clinicians. This is particularly important given that time constraints are frequently cited as a barrier to participation in continuing medical education [18].

The slightly lower, though still high, rating for suitability for training others (3.58) suggests that although participants felt capable of teaching others, they might benefit from additional pedagogical support or increased confidence in the trainer role. This aligns with adult learning theory, which emphasizes that content expertise does not automatically translate into teaching competence [19]. Future iterations

might incorporate broader trainer training skills development, perhaps through peer teaching practice sessions or mentorship from experienced trainers.

The successful completion of 79 community training sessions by 60% of TtT participants indicates substantial knowledge dissemination. Reaching 125 healthcare workers (85 doctors, 26 nurses, and 14 midwives) through tiered training demonstrates the multiplier effect of the TtT approach. Assuming each trained healthcare worker sees approximately 20–30 patients per month and applies improved depression screening and management skills, the potential impact on the population is substantial. This tiered model is particularly valuable in contexts with limited specialist availability, such as Indonesia, where the ratio of psychiatrists is 0.27 per 100,000 [5].

The 40% of scholars who did not implement community training represents an area for improvement. The identified barriers—time constraints, lack of institutional support, organizational challenges—are common in implementation science. Strategies to address these barriers could include: pre-training agreements with healthcare facility administrators to support community training, providing implementation toolkits with scheduling templates and marketing materials, building peer support networks for scholars, and offering microgrants or institutional recognition to encourage community implementation [20].

Preliminary Patient Outcomes: Proof-of-Concept Evidence

A distinctive feature of this implementation study is the inclusion of preliminary patient outcome data, providing proof-of-concept that improved provider competency can translate into patient benefits. Although the sample size ($n=96$) was not determined through prospective power calculations and the study lacked a control group, several factors support the validity and interpretation of these preliminary findings: (1) robust effect sizes observed across multiple outcome domains, (2) a 100% patient follow-up rate at 3 months, (3) consistency with evidence from controlled trials of similar interventions, and (4) the biological plausibility of the observed associations. Similar opportunistic sample sizes have been reported in preliminary effectiveness studies in comparable settings, with samples of 85–120 patients considered adequate for proof-of-concept evaluations when effect sizes are large [32],[33].

Improvement in Depression: The mean PHQ-9 reduction of 6.1 points (95% CI: 5.3–6.9) exceeded the minimal clinically important difference threshold of 5 points, indicating a significant clinical benefit. The shift from moderate depression (mean baseline score of 14.2) to mild depression (mean score of 8.1 after 3 months) suggests the potential for meaningful functional improvement for patients. The treatment response rate of 64.6% (decrease of ≥ 5 points) is comparable to results reported in randomized controlled trials of depression interventions in primary care [34],

although direct comparisons should be made with caution given the lack of a control group in our study. The remission rate of 21.9% (PHQ-9 <5) at 3 months, while modest, is encouraging given the primary care context and short follow-up period, as depression treatments typically require 3-6 months for full therapeutic effect [35].

Medication Adherence and Blood Pressure Control: Among patients with comorbid hypertension (n=58), the improvement in the MMAS-8 score from 5.3 (low adherence) to 7.1 (high adherence) suggests that trained healthcare workers may have successfully addressed adherence barriers through patient education and counseling. The selection of blood pressure as an outcome measure was justified by several considerations: (1) the high comorbidity between depression and hypertension in the Indonesian primary care population, (2) the frequent manifestation of somatic symptoms in the presentation of depression in this cultural context, (3) its usefulness as an objective physiological proxy for monitoring response to mental health interventions, and (4) its reflection of the quality of holistic integrated care.

The observed improvements in blood pressure control (a 14.4 mmHg decrease in SBP, an 8.3 mmHg decrease in DBP) and an increase in the proportion achieving target blood pressure (from 31.0% to 67.2%) demonstrate the potential benefits of integrated care. While we cannot definitively establish a cause-and-effect relationship without a control group, these findings make biological sense: successful treatment of depression can improve medication adherence (as evidenced by improvements in the MMAS-8), reduce physiological stress responses, improve health behaviors, and increase patient engagement in chronic disease management [36]. These findings align with existing literature showing that untreated depression worsens chronic disease outcomes [37], and suggest that integrated mental health care in primary care may provide benefits that extend beyond depressive symptoms to overall health outcomes.

Practice Transformation: Substantial increases in depression screening rates (18% to 72%), scheduled follow-up (24% to 69%), and provision of psychosocial education (31% to 84%) indicate a transformation in clinical practice patterns following the training. These process improvements indicate that the training successfully changed health care worker behaviors and clinical workflows, not just knowledge. The high screening rates, in particular, suggest that depression detection is becoming routine rather than sporadic, potentially addressing the historical problem of underdetection in Indonesian primary care.

The effectiveness of the train-the-trainer model in our study supports findings from systematic reviews that identified blended learning with interactive workshops as generating large effect sizes ($d=0.78-0.65$) [29]. Our delivery, largely online due to geographic constraints, achieved similar effectiveness, suggesting that with appropriate design, online training can rival face-to-face approaches.

The high sustainability demonstrated by sustained self-efficacy and a 60% community implementation rate compares favorably with studies in similar contexts.

An implementation study in Brazil reported a 68% increase in treatment initiation and a 34% reduction in specialist referrals after primary care training [30], results we anticipate will be achieved as trained clinicians implement improved skills over time.

Cultural Adaptation and Contextual Relevance

The success of this training underscores the importance of cultural adaptation in mental health interventions. By applying Bernal and Sáez-Santiago's Ecological Validity Model, our adaptation addressed multiple dimensions: language (Indonesian terminology), content (Indonesian case scenarios), concepts (culturally relevant expressions of suffering), methods (interactive approaches valued in Indonesian education), and context (the realities of the primary care system) [31].

The scholars' spontaneous local adaptations – translating into regional dialects, incorporating discussions of traditional healing – demonstrate that providing a culturally tailored foundation empowered them to further tailor the training to their specific communities. This multi-level adaptation (central adaptation plus local adjustment) may be a key success factor for interventions in culturally diverse countries.

The integration of the spiritual-religious dimension, although not systematically measured, emerged in qualitative feedback as a crucial component. Given that research indicates 78% of Indonesians consider spirituality important in mental health [26], future training should explicitly incorporate spiritual assessment and religion-integrated approaches when appropriate, consistent with the principles of culturally sensitive care.

Study Limitations

Several limitations should be considered when interpreting these findings. First, and most importantly, the absence of a control group is the primary constraint on causal inference regarding patient outcomes. While the large effect sizes, biological plausibility, and consistency with prior controlled trials support the credibility of findings, contributions from natural symptom trajectory, increased clinical attention, or concurrent quality improvement activities cannot be excluded. This limitation is inherent to the Type 1 implementation design and is addressed by the recommendation for a Phase III randomized controlled trial.

Second, patient recruitment was opportunistic – 96 patients were enrolled from the caseloads of participating scholars rather than through prospective, population-based sampling. Patients who did not access care due to stigma, geographic barriers, or other factors are not represented, which limits generalizability. The absence of confounder adjustment for patient-level analyses (e.g., treatment modality, baseline comorbidity burden, provider characteristics) further constrains interpretation; future

studies should incorporate multivariable adjustment and systematic treatment documentation.

Third, the 3-month follow-up period, while sufficient to detect initial treatment response, is insufficient to assess sustained remission, relapse rates, or the long-term durability of practice change. Depression is frequently a chronic, recurrent condition requiring extended management. Fourth, provider knowledge and clinical reasoning were assessed through written instruments and case vignettes rather than direct clinical observation or standardized patient encounters. This approach provides evidence of cognitive competency but does not capture actual clinical performance with real patients. Similarly, the single-item self-efficacy scale measures subjective confidence rather than the full psychological construct of self-efficacy.

Fifth, the quality and content of community training sessions were not assessed through direct observation or standardized evaluation; implementation reports varied in detail and may not fully capture training fidelity. Sixth, the predominantly online delivery, while pragmatically necessary given Indonesia's geography, may limit generalizability to settings with poor internet connectivity. Steps taken to mitigate this included conducting all sessions via Zoom with stable internet as an inclusion criterion, using standardized slide decks and facilitator guides, and requiring scholars to submit structured implementation reports as a quality assurance measure. Finally, data on the 35.4% of patients who did not achieve treatment response were not collected, limiting insight into treatment failure and opportunities for intervention refinement.

Implications for Practice and Policy

These findings have several important implications for improving primary care mental health capacity in Indonesia and similar contexts. First, the demonstrated effectiveness and high practicality of the training, combined with promising preliminary evidence of benefits for patients, suggest the potential for adapted modules for broader implementation. With appropriate institutional support, the TtT model has the potential to expand mental health competencies across approximately 10,000 community health centers in Indonesia, although systematic evaluation through a Phase III trial is needed before definitive recommendations for nationwide scale-up are made.

Second, the strong integration of family medicine principles demonstrates that mental health training need not be isolated but can reinforce core values of primary care. The preliminary finding that depression management is associated with improved blood pressure control in hypertensive patients exemplifies the holistic and integrated approach that is central to family medicine. This integration may facilitate acceptance and adoption by primary care providers who view mental health as a critical part of their comprehensive care mission, rather than an additional burden.

Third, the successful tiered training reaching 125 healthcare workers, who subsequently treated patients with early evidence of clinical improvement, demonstrates proof of concept for the multiplier effect of the TtT approach. This model may prove valuable in contexts with severe mental health workforce shortages, where task allocation to non-specialist providers is crucial. However, the 40% non-implementation rate suggests that training alone is not enough—supportive infrastructure is needed.

Fourth, substantial improvements in clinical practice indicators (screening rates from 18% to 72%, follow-up from 24% to 69%) demonstrate the potential for real practice transformation beyond isolated cases. This suggests that training can successfully embed depression care into routine primary care workflows, creating potentially sustainable systems change. Fifth, identified implementation barriers reinforce that a supportive ecosystem, including protected time for mental health service delivery, institutional support, clear protocols, and possibly incentives, will be necessary for optimal implementation and sustainability.

Sixth, preliminary evidence regarding the benefits of integrated care (improved depression associated with better medication adherence and blood pressure control) supports a model in which mental and physical health are addressed simultaneously. This has potential implications for the increasing burden of non-communicable diseases in Indonesia, suggesting that primary care programs may benefit from integrating mental health screening and treatment into chronic disease management protocols, although this hypothesis requires rigorous testing.

Recommendations for Future Research and Implementation

Based on our findings and limitations, we recommend several directions for future research and program development. Longitudinal studies should track trained providers and their patients for 12–24 months, measuring sustained knowledge retention, ongoing practice improvement, depression relapse rates, and long-term functional outcomes. This would provide stronger evidence of the durability of the training and help identify when reinforcement sessions may be needed.

Randomized controlled trials comparing patient outcomes between trained and untrained providers, or comparing different training modalities (online vs. face-to-face, varying durations, with or without ongoing supervision), would strengthen causal conclusions about the training's effectiveness. Facility-level randomized trials could account for organizational factors and reduce contamination between intervention and control groups.

Economic evaluations assessing the cost-effectiveness and cost-benefit ratio of the TtT approach compared with alternative capacity-building strategies (e.g., specialist consultation models, telemedicine, task shifting to community health workers) would inform resource allocation decisions. The cost per quality-adjusted

life year (QALY) gained and calculations of return on investment would be invaluable to policymakers.

Implementation science research investigating strategies to maximize the uptake of tiered training among TtT graduates can inform support structures. Testing various incentive models, peer support approaches, or institutional partnership frameworks can identify effective implementation facilitators. Studies examining barriers and facilitators to sustained clinical practice change will help optimize intervention components.

Qualitative research exploring patients' experiences of care from trained providers can clarify whether increased provider competency translates into improved patient-centered care from the patient's perspective. Patient satisfaction, therapeutic alliance, and reduction in perceived stigma should be assessed. Furthermore, exploring the reasons for treatment nonresponse among the 35.4% who did not achieve improvement on the PHQ-9 can inform intervention refinement.

Studies examining optimal dosage and treatment protocols – whether a single training session is sufficient or periodic reinforcement sessions are necessary, the optimal frequency of patient follow-up, and the appropriate duration of antidepressant treatment in primary care – will guide clinical protocol development. Comparative effectiveness research examining various psychosocial intervention modalities (behavioral activation, problem-solving therapy, brief CBT) that can be delivered in primary care will identify optimal approaches.

Finally, adaptation and evaluation of the module for other mental health conditions (anxiety disorders, substance abuse, perinatal mental health, and child and adolescent mental health) could expand the model's impact beyond depression. Given the high comorbidity between depression and anxiety, as well as the common presentation of mixed anxiety and depression in primary care, expanding the training content would be invaluable.

To scale up implementation, we recommend: establishing regional training centers with master trainers who can deliver the TtT program regularly, with integrated quality assurance mechanisms; creating online learning communities for ongoing mentoring, case consultations, and peer support among trained providers; developing standardized clinical protocols and decision-support tools to guide depression management in primary care; partnering with professional associations to integrate training into continuing medical education requirements and competency frameworks; advocating for policy support including the inclusion of depression screening in national primary care quality indicators, the inclusion of first-line antidepressants in the essential medicines list, and payment/incentive structures for mental health services; creating simplified and tailored materials appropriate for interprofessional audiences (nurses, midwives, community health workers) to maximize the potential for task-sharing; and establishing a monitoring and evaluation

system to track implementation fidelity, provider adherence to the protocol, and ongoing patient outcomes at scale.

4. Conclusion

This Type 1 implementation study demonstrated that the MDD Minds Train-the-Trainer module, adapted for Indonesia, was effective in improving primary care physicians' knowledge and clinical reasoning for depression management and was deemed practical for implementation across a range of primary care settings in Indonesia. Significant increases in knowledge (67.48% to 93.24%, $p < 0.001$, Cohen's $d = 2.87$), sustained increases in self-efficacy (2.3 to 3.7 on a 5-point scale), and successful community-level training reaching 125 healthcare workers across 12 provinces provide strong evidence supporting the effectiveness and feasibility of the module training.

Importantly, this study provides promising preliminary evidence suggesting that improved provider competency can translate into patient benefits. The 96 patients cared for by trained healthcare workers demonstrated clinically significant improvements: a mean decrease in PHQ-9 score of 6.1 points ($p < 0.001$), a treatment response rate of 64.6%, and a remission rate of 21.9% at 3 months. Among patients with comorbid hypertension, substantial improvements in medication adherence (1.8-point improvement in the MMAS-8, $p < 0.001$) and blood pressure control (14.4 mmHg decrease in SBP, $p < 0.001$) suggest the potential benefits of integrated care. However, these patient-level results should be interpreted as proof of concept rather than definitive proof, given the lack of a control group and the opportunistic sample size. A confirmatory Phase III trial with a randomized controlled design and a larger sample size is needed to establish definitive clinical effectiveness.

The integration of family medicine primary care principles – patient-centered care, family-oriented medical care, community-oriented primary care, and comprehensive patient management – across training and its implementation in the community suggests that mental health capacity building can reinforce, rather than compete with, core primary care values. This integration is likely to increase the acceptability, relevance, and sustainability of training while promoting holistic care that addresses mental and physical health simultaneously.

The train-the-trainer approach demonstrated feasibility for knowledge dissemination, with 60% of trained scholars conducting community sessions. Although implementation barriers prevented some scholars from conducting tiered training, identified barriers – particularly related to workload constraints and institutional support – could be addressed through improved implementation infrastructure. High practicality ratings and strong participant satisfaction indicate readiness for broader dissemination, subject to supportive policies and institutional frameworks.

As Indonesia grapples with an 85% treatment gap in depression care and a severe mental health workforce shortage, scalable, evidence-based capacity-building interventions are urgently needed. This study provides proof of concept that culturally tailored tiered training, oriented toward family medicine, with preliminary evidence of patient benefit, may offer a potentially scalable model to address this gap. With adequate institutional support, policy enforcement, standardization of clinical protocols, and ongoing program refinement based on implementation lessons learned and rigorous Phase III evaluation, the MDD Minds TtT module adapted for Indonesia represents a promising pathway to strengthening primary care-based mental health services across Indonesia and potentially in other low- and middle-income countries facing similar challenges.

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Ethical Approval

This study received ethical approval from the Research Ethics Committee of the Faculty of Medicine, Pelita Harapan University (approval number: 094/K-LKJ/ETIK/II/2025).

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript. Dewanto Andoko is a resident physician in the Family Medicine Primary Care Program at Pelita Harapan University and served as principal investigator. Nicolaski Lumbuun, Darien Alfa Cipta, Marshell Timotius Handoko, and Tirta Darmawan Susanto are faculty supervisors and committee members for the research but had no financial interests in the study outcomes. No pharmaceutical companies or commercial entities provided funding or had involvement in this research.

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Data Availability Statement

The datasets generated and analyzed during this study are available from the corresponding author upon reasonable request. Training materials and community implementation reports are archived with Pelita Harapan University Faculty of Medicine and available to qualified researchers, subject to data sharing agreements protecting participant confidentiality.

Author Contributions (CRediT)

Dewanto Andoko: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Writing - Original draft preparation, Project administration, Funding acquisition.

Nicolaski Lumbuun: Conceptualization, Methodology, Supervision, Writing - Review & editing.

Darien Alfa Cipta: Conceptualization, Methodology, Supervision, Writing - Review & editing.

Marshell Timotius Handoko: Supervision, Methodology, Writing - Review & editing.

Tirta Darmawan Susanto: Supervision, Writing - Review & editing.

Declaration of Generative AI

The authors declare the use of Google Gemini (a large language model) during the final preparation of this manuscript. Specifically, the AI tool was utilized to verify adherence to formatting guidelines (including spacing and layout), ensure citation placement consistency, and perform technical proofreading for correcting grammar, spelling and syntax. The AI was not used to generate, alter, or interpret the research data, nor did it change the substantive clinical or scientific content written by the authors. All final editorial decisions and the integrity of the work remain the sole responsibility of the authors.

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