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Empowering Posyandu Cadres Through Digital Anticipatory Guidance for Responsive Parenting Education

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ABSTRACTS

Introduction: Posyandu cadres play an important role in connecting community health services with families, yet their capacity to provide structured education on maternal sensitivity and responsive caregiving remains limited. This community engagement program aimed to strengthen Posyandu cadres' skills in maternal sensitivity, responsive caregiving, child growth and development, and the use of digital anticipatory guidance for parenting education. **Methods:** A participatory community empowerment approach was implemented over 16 weeks in Cibodas Village, Bandung , Indonesia. The program involved five sequential stages: program orientation, cadre training, digital technology implementation, mentoring and evaluation, and sustainability planning. Thirty Posyandu cadres participated in interactive training, case simulations, demonstrations, and hands-on practice using the *Child Cognitive Stimulation Application*. Cadre skills were assessed before and after training using a program-specific instrument comprising 14 skill indicators. **Results:** The mean cadre skill score increased from 3.37 before training to 12.87 after training, representing an increase of 9.50 points. Pre-training scores ranged from 1 to 5, whereas post-training scores ranged from 12 to 14. All 30 participants achieved higher post-training scores, exceeding the program target of improvement among at least 80% of cadres. **Conclusion:** Digital anticipatory guidance training was associated with a substantial descriptive improvement in Posyandu cadres' skills and achieved the predefined program target. Integrating cadre capacity building with digital educational resources offers a promising approach to strengthening community-based parenting education. Further evaluation is needed to determine its sustained implementation and outcomes among mothers.

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1. INTRODUCTION

The early period of an infant's life represents a crucial stage for subsequent growth and developmental outcomes. During this period, a mother's ability to recognize infant cues and respond appropriately contributes to cognitive and socio-emotional development. At the community level, however, responsive parenting practices remain challenging. Mothers may have limited understanding of how to identify and respond to their infants' developmental needs, while Posyandu cadres may not yet have sufficient capacity to provide structured parenting education. Although Posyandu services are widely accessible within communities, their activities have traditionally focused more on monitoring physical growth and health status. Education on responsive caregiving and developmental stimulation has not always been systematically incorporated into routine services (Perdani et al., 2025; Rachmawati et al., 2022; Dinas Kesehatan Kota Cimahi, 2019).

Cibodas Village is located in Solokanjeruk District, Bandung Regency, and represents a rural to semi-urban community. Based on preliminary data used in the program proposal, approximately 150–250 children aged 0–59 months live in the area, with an estimated monthly Posyandu attendance rate of 65–80%. The community is served by approximately four to six active Posyandu units, each supported by five to eight cadres. Most cadres have access to smartphones, creating an opportunity to incorporate digital technology into community-based health education. Digital resources may also extend learning beyond scheduled Posyandu activities by allowing educational materials to be accessed repeatedly when needed (Badan Pusat Statistik Kabupaten Bandung, 2024; Mulyani et al., 2025).

The initial assessment identified several gaps requiring intervention. Cadres had limited resources to support education on maternal sensitivity and responsive caregiving, while available educational activities tended to rely on general information delivered verbally. A structured digital resource for anticipatory guidance was not yet available, and educational support for mothers was largely concentrated around scheduled Posyandu visits. From the family perspective, mothers also required further support in recognizing and responding to infants' emotional, social, communication, and developmental stimulation needs. These findings provided the rationale for developing a cadre training program supported by digital anticipatory guidance as a community empowerment strategy.

Priority Partner Problems

The community partner in this program was the Binangkit Posyandu Group in Cibodas Village. The group represents a non-economically productive community organization involved in maternal and child health services. Its direct interaction with families and close relationship with local residents provide a strategic basis for strengthening community-based parenting education. Following the situational assessment and consultation with the partner, five priority problems were identified:

1. Posyandu cadres required greater capacity to provide parenting education.
2. Mothers' ability to recognize and respond to infants' developmental needs required further improvement.
3. Educational media and approaches for parenting support within Posyandu services remained limited.
4. Digital technology had not been optimally incorporated into community-based health and social services.
5. Continuous education and support for mothers beyond routine Posyandu visits remained limited.

Program Objectives

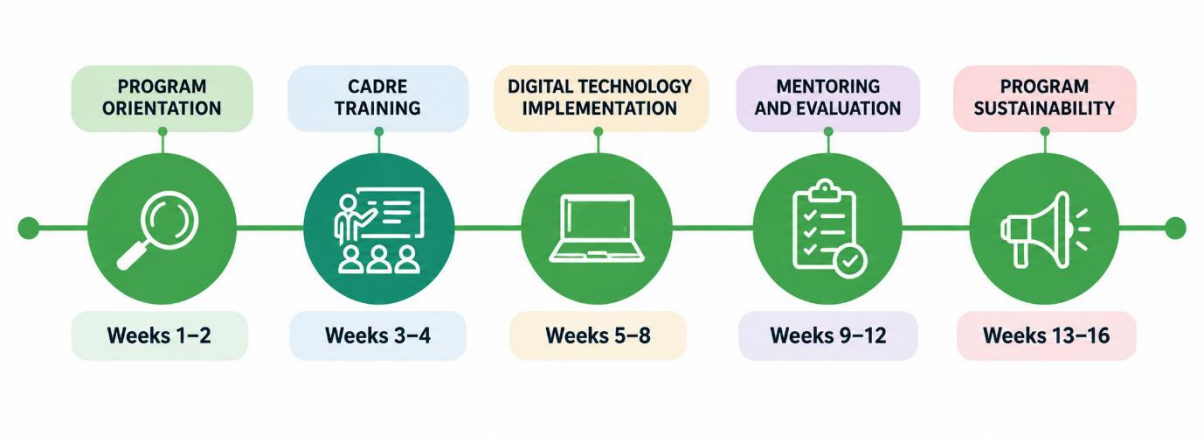
The program aimed to strengthen the role of Posyandu cadres in providing community-based parenting education. The intervention focused on improving cadres' knowledge and skills related to maternal sensitivity, responsive caregiving, infant growth and development, and the use of digital anticipatory guidance. The program targeted an improvement in knowledge and/or skills among at least 80% of participating cadres and increased parenting knowledge among at least 70% of participating mothers. Additional outputs included the availability of a digital anticipatory guidance resource for cadre-led education and its integration into routine educational activities at Posyandu.

2. METHODS

This community engagement program employed a participatory empowerment approach that actively involved community partners throughout the planning, implementation, and evaluation processes. The program was conducted in Cibodas Village, Solokanjeruk District, Bandung Regency, over a 16-week period. Implementation comprised five sequential stages:

program orientation, Posyandu cadre training, digital technology implementation, mentoring and evaluation, and program sustainability. The timeline and sequence of these stages are presented in Figure 1.

Figure 1. Five stages and timeline of the community engagement program



1. Program Orientation

Program orientation was conducted during weeks 1–2 and involved Posyandu cadres, village representatives, and other relevant stakeholders. This stage introduced the program objectives, expected benefits, implementation procedures, anticipated outcomes, and responsibilities of each participating party. It also served to identify partner needs, establish mutually agreed priority problems, and strengthen stakeholder commitment to the implementation of digital anticipatory guidance.

2. Posyandu Cadre Training

Cadre training was conducted during weeks 3–4 and focused on strengthening cadres' capacity to support mothers in providing developmentally appropriate care for their infants. The training covered maternal sensitivity, responsive caregiving, stages of child growth and development, and the use of age-appropriate anticipatory guidance. Learning activities included interactive presentations, discussions, case simulations, demonstrations, and hands-on practice using digital educational resources.

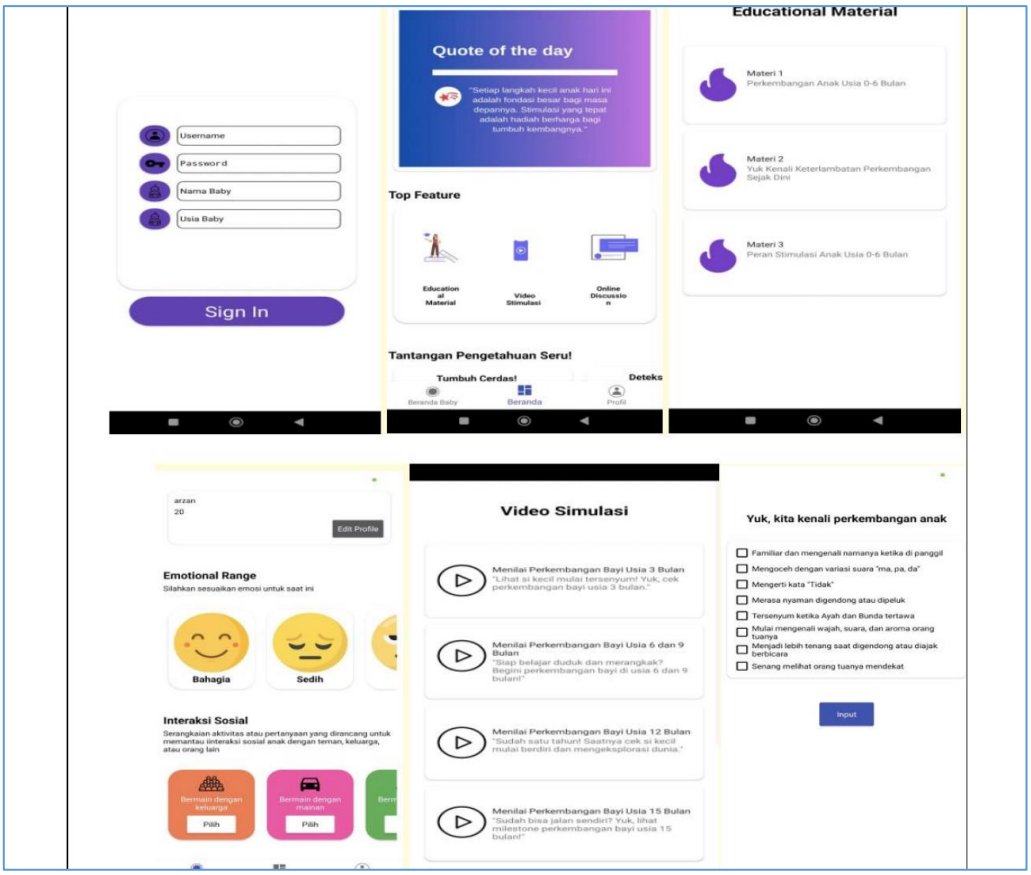
A total of 30 Posyandu cadres participated in the training. Their skills were assessed before and after the training using a program-specific instrument comprising 14 skill indicators. The pre- and post-training assessments were used to determine changes in cadre skills following the intervention.

3. Digital Technology Implementation

Digital technology was implemented during weeks 5–8 using the *Child Cognitive Stimulation Application* (*Aplikasi Stimulus Kognitif Anak*) as a digital resource for anticipatory guidance. The Android-based application is available in Indonesian and has a file size of 35.93 MB. Previous usability testing reported a System Usability Scale (SUS) score of 78.6, indicating good usability (Srinatania et al., 2025a).

The application provides several features to support parenting education, including educational materials, developmental simulation videos, online discussion facilities, assessment of children's emotional responses and social interactions, and tools for monitoring child growth and development. Cadres received hands-on instruction in navigating these features and using the application as a resource when providing education to mothers. The main interfaces and features of the application are shown in Figure 2.

Figure 2. User interface and key features of the Child Cognitive Stimulation Application



4. Mentoring and Evaluation

Mentoring and evaluation were conducted during weeks 9–12 to support cadres in applying the digital anticipatory guidance within community-based parenting education. The program team provided assistance in using the application, offered feedback on cadres' educational practices, and helped address technical and practical challenges encountered during implementation.

At this stage, the evaluation focused on changes in cadre skills based on pre- and post-training assessments across the 14 skill indicators. Evaluation of mothers' understanding and caregiving practices, as well as the consistency of digital guidance use, was continued in the subsequent stage in accordance with the program targets.

5. Program Sustainability

The sustainability stage was conducted during weeks 13–16 and focused on integrating digital anticipatory guidance into routine Posyandu activities. Selected cadres were encouraged to serve as key facilitators for continued parenting education within the community. Coordination with village authorities and the local Puskesmas was also undertaken to support the continuation of educational activities after the formal program period. This strategy was intended to promote independent and sustained use of digital resources for community-based parenting education.

3. RESULT AND DISCUSSION

1. Program Orientation

The program orientation served as the initial stage for establishing a shared understanding between the implementation team and community partners. During this stage, the program plan was introduced, and partner needs related to maternal sensitivity, responsive caregiving, and digital educational resources were identified. The participating cadres also expressed their commitment to completing the training and subsequent technology implementation activities. The achievements of this stage are summarized in Table 1.

Table 1. Outcomes of the program orientation

Component	Program Target	Outcome	Status
Program orientation	≥80% of partners participate	The orientation was completed as the initial program activity	Completed
Partner needs assessment	Priority needs and problems identified	Maternal sensitivity, responsive caregiving, and digital educational resources were established as priority areas	Completed
Partner engagement	Partners participate in program implementation	Cadres participated in the training and technology implementation	Completed

2. Posyandu Cadre Training

A total of 30 cadres completed both pre- and post-training skill assessments. The mean skill score increased from 3.37 before training to 12.87 after training, representing a mean increase of 9.50 points. Pre-training scores ranged from 1 to 5, whereas post-training scores ranged from 12 to 14. All 30 participants obtained higher scores after the intervention. Thus, 100% of the participating cadres demonstrated improvement, exceeding the program target of at least 80% (Table 2).

Table 2. Pre- and post-training skill assessment of Posyandu cadres (n = 30)

Indicator	Pre-training	Post-training	Outcome
Participants assessed	30	30	Complete data
Mean skill score	3.37	12.87	Increase of 9.50 points
Score range	1–5	12–14	Higher after training
Participants showing improvement	—	30/30	100% improved
Program target	≥80% demonstrate improvement	100% demonstrated improvement	Achieved

The marked increase in the mean skill score following training is illustrated in Figure 3.

Table 3. Comparison of Mean Cadre Skill Scores Before and After Training

Assessment	Mean Skill Score	Change
Pre-training	3.37	—
Post-training	12.87	+9.50

3. Digital Technology Implementation

The *Child Cognitive Stimulation Application* was introduced as the primary digital technology supporting the program. During training, cadres received an orientation to the application and participated in hands-on practice to become familiar with its functions. The application was subsequently introduced as a digital resource to support parenting education within Posyandu services. At this stage, routine use of the application was still being monitored through the mentoring process (Table 3).

Table 3. Implementation of the digital technology

Aspect	Outcome	Description
Technology availability	The *Child Cognitive Stimulation Application* was available as the primary digital resource	Consistent with the program design
User orientation	Cadres received orientation and hands-on practice in using the application	Conducted during cadre training
Application in Posyandu	The application was introduced as a supporting resource for parenting education	Continued monitoring during mentoring

4. Mentoring and Evaluation

The interim evaluation demonstrated a positive change in cadre skills following the training. All 30 participants achieved higher post-training scores than their respective pre-training scores, thereby meeting the predetermined target for cadre improvement.

Evaluation of mothers' parenting knowledge and practices was still in progress at this stage. Similarly, the consistency of digital application use and continuation of parenting education within routine Posyandu activities had not yet reached the final evaluation point. These indicators were therefore reported as ongoing rather than as final program outcomes (Table 4).

Table 4. Program evaluation outcomes at the current implementation stage

Evaluation Domain	Program Indicator	Current Outcome	Status
Cadre skills	≥80% of cadres demonstrate improvement	30/30 participants achieved higher post-training scores	Achieved
Mothers' parenting knowledge and practices	≥70% demonstrate improved parenting knowledge	Data collection and evaluation ongoing	Ongoing
Use of digital guidance	Incorporated into Posyandu activities	Orientation and hands-on practice completed	In progress
Continuity of parenting education	Education continues beyond the main program activities	Sustainability mechanisms being strengthened	In progress

5. Program Sustainability

At the current stage, sustainability efforts focused on strengthening implementation and continued mentoring. Planned mechanisms included incorporating the digital guidance into routine Posyandu activities, strengthening the role of key cadres as community facilitators for parenting education, monitoring application use, and maintaining coordination with village authorities and the local Puskesmas.

Longer-term sustainability will be evaluated based on the consistency of digital guidance use and the continuation of parenting education after completion of the main program activities. Accordingly, sustainability outcomes are not presented as final achievements at this stage. A counseling session on Cek KLIK and hazardous food additives was delivered to 24 residents of Tosale Village. Mean scores increased across all five measured constructs, with the largest gain observed in attitude; however, the overall changes were modest, and no comparison remained statistically significant after correction for multiple testing. Following the session, 83.3% of participants achieved an overall score of at least 4.0, meeting the 80% target based on the post-counseling score criterion. In contrast, 58.3% of participants showed an increase in their overall scores, falling short of the 80% target based on improvement. The mean skill score increased by 5.1% relative to baseline, below the predefined 20% improvement target. These findings indicate that the program met its post-counseling score target but did not meet its improvement targets. Further evaluation using a controlled design and an objective assessment of food-safety skills is needed to determine whether the observed changes reflect intervention effects and translate into safer food-selection practices.

The program demonstrated a substantial descriptive improvement in Posyandu cadres' skills following the training. The mean score increased from 3.37 at baseline to 12.87 after training, corresponding to a 9.50-point increase. Moreover, all 30 participating cadres achieved higher scores at post-training assessment than at baseline. This result exceeded the predefined program target, which required improvement in at least 80% of participating cadres. As the current evaluation is based on descriptive comparisons of pre- and post-training scores, these findings indicate an observed improvement in performance rather than evidence of statistical significance.

Strengthening cadre skills is particularly relevant within a community empowerment approach because Posyandu cadres serve as an important link between health services and families. Improving their capacity to deliver parenting education may broaden the role of Posyandu beyond routine monitoring of children's physical growth and health toward more comprehensive support for parenting and child development. The combination of structured training and digital resources may further facilitate this role by providing educational materials that cadres can revisit and use during interactions with mothers. This approach is consistent with previous community-based initiatives indicating that digital health resources can support cadre learning and facilitate repeated access to educational content (Mulyani et al., 2025).

An additional component of the program was the use of the *Child Cognitive Stimulation Application* as a digital resource for anticipatory guidance. Rather than relying solely on written information, the application provides developmental simulation videos, resources for assessing emotional responses and social interactions, and tools for monitoring child growth and development. Previous usability testing of the application yielded a System Usability Scale score of 78.6, suggesting favorable usability (Srinatania et al., 2025a). Its content is also supported by previous work on the assessment of socio-emotional development and research examining factors associated with socio-emotional development among infants during the first six months of life (Srinatania et al., 2025b; Srinatania et al., 2025c).

The use of digital technology may also help address the limitations of education that occurs only during scheduled Posyandu visits. Digital resources allow cadres to revisit learning materials and potentially support mothers beyond face-to-face educational sessions. Nevertheless, access to technology alone does not ensure sustained implementation. Continued mentoring, cadre engagement, ease of application use, and integration into

existing Posyandu activities are likely to influence whether the technology becomes part of routine community practice. Therefore, the current program emphasizes both technological implementation and capacity building rather than treating the application as a stand-alone intervention.

Despite the favorable changes observed among cadres, the findings should be interpreted within the scope of the current evaluation. Assessment of mothers' parenting knowledge and practices was still ongoing; consequently, no conclusion can yet be drawn regarding program effects at the family level. Similarly, the present findings do not establish whether the cadres' improved skills will be maintained over time or consistently translated into parenting education during routine Posyandu activities. Further evaluation is therefore required to examine mothers' outcomes, sustained application use, and continuity of cadre-led education. These indicators are important for determining whether improvements achieved during training translate into meaningful and sustainable benefits at the family and community levels.

4. CONCLUSION

The digital anticipatory guidance training program implemented with Posyandu cadres in Cibodas Village demonstrated a marked descriptive improvement in cadre skills. The mean score increased from 3.37 before training to 12.87 after training, representing a 9.50-point increase, and all 30 participants achieved higher post-training scores. These findings exceeded the program target of improvement among at least 80% of participating cadres.

The *Child Cognitive Stimulation Application* was also successfully introduced and practiced as a digital resource to support parenting education within Posyandu services. However, evaluation of mothers' parenting knowledge and practices, routine use of the application, and longer-term program sustainability remains ongoing. Completion of these assessments is required to determine the broader impact of the program at the family and community levels.

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