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Community-based health promotion for rural Thai children

The Development of a Community-Based Health Promotion Model for Preschool Children in Rural Roi Et Province, Thailand: A Participatory Action Research Study

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Abstract

Introduction: Developmental delay can have negative long-term cognitive and psychiatric sequelae. In Roi Et Province, 31.70% of preschool children were identified as having suspected developmental delay. However, evidence on participatory community-based health promotion models for improving preschool child development remains limited. Therefore, this study aimed to explore parents' needs regarding preschool child development and to develop, implement, and evaluate a community-based health promotion model.

Methods: This participatory action research comprised three phases. Phase I explored the actual situation and parents' needs using quantitative and qualitative methods. Phase II involved the development of the model, and Phase III implemented and evaluated the developed model using a cluster-allocated quasi-experimental pretest–posttest control group design with 60 participants in each group. Data were collected using the Developmental Surveillance and Promotion Manual (DSPM), parental knowledge and behavioral questionnaires, in-depth interviews, and focus group discussions. Data were analyzed using descriptive statistics, t-tests, and content analysis.

Results: Phase I identified four themes: limited parental knowledge and confidence in promoting child development, lack of continuity between home- and preschool-based developmental promotion, inadequate home and community environments, and limited monitoring and follow-up of child development. At baseline, most parents demonstrated moderate levels of knowledge (86.7%) and parental caregiving behaviors (74.2%). Based on

these findings, Phase II developed a community-based health promotion model comprising seven components: (1) parent education and skills training, (2) individualized developmental activity planning, (3) establishment of community-based parent support networks, (4) strengthening the continuity and sustainability of developmental monitoring and promotion at Preschool Child Development Centers, (5) guidance on creating safe home environments and promoting child development, (6) establishment of experiential learning spaces within Preschool Child Development Centers, and (7) policy recommendations. Following implementation in Phase III, parents in the experimental group demonstrated significantly higher knowledge and parental caregiving behavior scores than at baseline. Furthermore, preschool children with developmental delays in the experimental group showed significantly greater developmental improvement than those in the control group ($P < 0.001$).

Conclusion: The community-based health promotion model improved parental knowledge, parental caregiving behaviors, and developmental outcomes among preschool children with developmental delays. The model may serve as a practical community-based approach to promoting sustainable preschool child development in rural communities resulting in a continuity and sustainability.

Keywords: Health Promotion; Child Development; Child, Preschool; Community Participation; Parents

Introduction

The preschool years are a critical period in child development characterized by rapid physical, cognitive, and socioemotional growth.^{1,2} The first six years of life represent the most critical window for child development, during which rapid brain development occurs. A nurturing environment that provides adequate stimulation, interaction, and learning opportunities is essential for achieving optimal developmental outcomes.^{3,4} Consequently, developmental delay during this period may result in long-term adverse cognitive and psychiatric outcomes, poor academic achievement, and impaired physical, cognitive, and learning abilities, including deficits in listening, reading, and comprehension skills, as well as reduced intellectual capacity and motivation for learning and daily life.^{1,5-7} The estimated global prevalence of developmental delay ranges from 10% to 15%.⁸ An estimated 52.9 million children younger than five years have developmental disabilities, approximately 95% of whom live in low- and middle-income countries.⁹ Furthermore, approximately 43% of children in developing countries are at risk of not achieving their developmental potential during the first five years of life.¹⁰

In Thailand, developmental screening coverage using the Developmental Surveillance and Promotion Manual (DSPM) has increased substantially, from less than 1% in 2013 to 90% in 2021.¹ Concurrently, the prevalence of suspected developmental delay increased from 3.91% during 2013- 2015 to 10 % during 2016 - 2018 and 26.48% during 2019–2021.¹ However, this increase may partly reflect the expansion of developmental screening coverage rather than a true increase in prevalence, as broader implementation of the DSPM enabled the identification of a greater number of children at risk. In Roi Et Province, northeastern Thailand, there were 24,024 children aged 0-5 years old. A survey was conducted in 2023 using DSPM screening tool

revealed that 31.70% of children at ages 9, 18, 30, 48, and 60 months were identified as having suspected developmental delay. Language and communication skills were the most affected at 23.10%, followed by fine motor skills at 19.14%.¹¹ Thus, early identification and timely intervention are essential to help preschool children achieve age-appropriate developmental milestones.

Children's development is primarily shaped within the family and is strengthened through close collaboration between families and Preschool Child Development Centers. Childcare begins at home, where parents' knowledge and understanding of child development provide the foundation for effective caregiving practices, particularly those that promote preschool child development.¹² Parents' ability to engage with and raise their children in a safe and appropriate manner is largely influenced by their knowledge of child development and childrearing.¹³ Appropriate parenting practices help children achieve age-appropriate developmental milestones and strengthen the parent-child relationship, which is essential for building children's resilience.¹⁴ Therefore, parents play a crucial role in promoting children's health, well-being and development.

Community-based health promotion for all age groups, including young children, strengthens community resilience and encourages community members to actively utilize available resources and capacities to improve community health.¹⁵ In the present study, community-based health promotion was operationalized through a participatory approach involving healthcare professionals, village health volunteers (VHVs), preschool teachers, parents, and community leaders. The intervention included community needs assessment, developmental screening using the DSPM, caregiver training on developmental stimulation, home visits, parent-child developmental activities, and collaboration among local stakeholders to support preschool child development. These coordinated efforts strengthened parental capacity, promoted early identification of developmental delay, and established a sustainable community support system.¹⁶ Community participation is essential for increasing parental awareness and responsibility for child health promotion and continuous developmental monitoring. Furthermore, collaboration among families, healthcare providers, local governments, and community organizations facilitates the development of supportive policies and sustainable interventions for preschool child development.^{17,18} Therefore, the communities play a pivotal role in promoting preschool child development.

Although community-based interventions have demonstrated benefits in promoting child development, evidence regarding the development and evaluation of participatory community-based health promotion models tailored to disadvantaged rural communities in Thailand remains limited. Therefore, this study aimed to explore parents' needs regarding preschool child development and to develop, implement, and evaluate a community-based health promotion model. The findings are expected to contribute to the optimal preschool child development, enabling children to reach their full potential and become valuable members of society in the future.

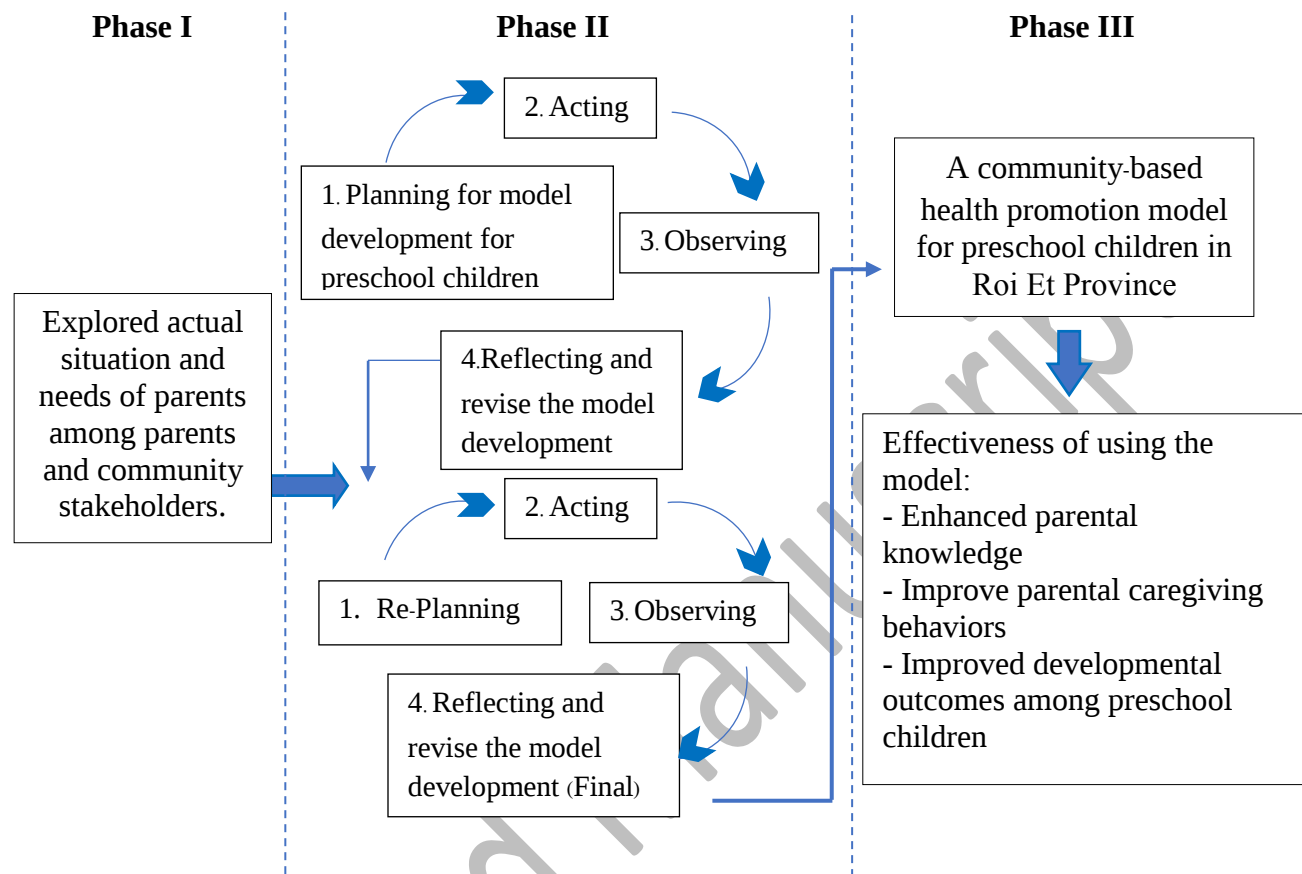
Materials and Methods

Design

This study employed participatory action research (PAR) design to explore parents' needs regarding preschool child development and to develop, implement, and evaluate a community-based health promotion model for preschool children. Based on the aforementioned evidence, PAR was employed because it promotes collaboration between researchers and community stakeholders in identifying problems, developing solutions, implementing interventions, and evaluating outcomes. Through active participation, PAR strengthens partnerships among healthcare professionals, community leaders, parents, and other local stakeholders, thereby enhancing community ownership and supporting sustainable improvements in preschool child development. The study was conducted from January to November 2023 following the PAR framework proposed by Kemmis and McTaggart,¹⁹ which comprised four iterative stages: planning, acting, observing, and reflecting. The research was conducted in three phases: (1) exploration of the actual situation and parents' needs, (2) development of the community-based health promotion model, and (3) implementation and evaluation of the developed model. Throughout the study, researchers and community stakeholders collaboratively identified problems, developed solutions, implemented interventions, and evaluated outcomes.

Setting

The study was conducted in rural communities in Roi Et Province, northeastern Thailand. The study was implemented through Preschool Children Development Centers in collaboration with their affiliated Health Promoting Hospitals. The participating communities were characterized by close collaboration among parents, preschool teachers, VHVs, community leaders, and healthcare professionals. At the beginning of the study, researchers and community stakeholders jointly assessed local child development issues, reviewed community strengths and needs, and established shared priorities for improving preschool child development through a participatory process. The overall PAR process and study framework are illustrated in Figure 1.



Parents of preschool children and community stakeholders, including preschool teachers, community leaders, village health volunteers, and healthcare professionals.

Figure 1. Research framework

Phase I: Exploration the actual situation and needs of parents. During Phase I, the researchers and community stakeholders collaboratively established the goals for developing a community-based health promotion model for preschool children. This phase was conducted between January and February 2023 using quantitative and qualitative methods to explore the actual situation and needs of parents. For the quantitative component, a cross-sectional survey was conducted. The sample size was calculated for the subsequent quasi-experimental phase using G*Power²⁰ based on a medium effect size of 0.50,²¹ a significance level (α) of 0.05, and a statistical power of 0.80. The calculation indicated that at least 51 participants per group were required. To compensate for potential attrition and ensure adequate statistical power for the subsequent study phases, the sample size was increased to 60 participants per group, resulting in a total of 120 participants. The same participants recruited in Phase I were subsequently enrolled in Phase III. Existing DSPM screening records maintained by local Health Promoting Hospitals were reviewed to identify eligible children aged 2–5 years with developmental delays. Parents of eligible children were then invited to participate. After providing written informed consent, participants completed questionnaires on demographic characteristics, parental knowledge, and

caregiving behaviors. The parental knowledge and caregiving behavior questionnaires were developed based on a review of the relevant literature. For the qualitative component, data were collected from 15 participants selected through purposive sampling using in-depth interviews. The interviews explored topics requiring additional information, including success factors and barriers to promoting preschool child development, and included open-ended questions to encourage participants to share their experiences, comments, and suggestions. The participants comprised two registered nurses, two preschool teachers, five VHVs, and six representatives of parents of children aged 2–5 years. An interview guide was developed by the research team based on the study objectives and relevant literature and was validated by three experts in qualitative research. The interview guide included open-ended questions such as: Please describe your experience in caring for or promoting the development of preschool children aged 2–5 years. And what are the most common developmental problems among preschool children in your community? Data collection continued until data saturation was achieved. All interviews were audio-recorded with participants' permission and lasted approximately 45–60 minutes. Findings from the quantitative and qualitative components were subsequently discussed with community stakeholders to identify priority issues, reflect on existing practices, and collaboratively develop the community-based health promotion model for preschool children in Phase II.

Phase II: Model development. Phase II involved developing a community-based health promotion model for preschool children following the PAR process, which consisted of planning, action, observation, and reflection. This phase consisted of two cycles. Cycle 1 was carried out from March to May 2023, during which feedback obtained through observation and reflection was used to refine the intervention. Cycle 2 was conducted from June to July 2023, to finalize and synthesize the community-based health promotion model. A total of 30 participants were purposively selected. They represented three stakeholder groups: (1) 15 parents of preschool children who served as primary caregivers, (2) 12 community stakeholders, including eight preschool teachers, two community leaders who were members of the Preschool Children Development Center Executive Committee, and two VHVs responsible for maternal and child health, and (3) three healthcare professionals, including two registered nurses and one developmental psychologist. However, the selected participants group is characterized by being stakeholders directly affected by the issue of delayed child development, and it also includes community leaders. This group has a high potential to represent the community effectively in working with government agencies and researchers to collaboratively develop an efficient preschool children care system within the community.

At the beginning of Phase II, the findings from Phase I were presented to all stakeholders to facilitate reflection on the current situation and identify priorities for model development. Subsequently, three structured stakeholder discussion sessions (45–60 minutes each) were conducted. The first session explored reviewing the findings from Phase I, identifying strengths, existing resources, barriers, and unmet needs related to preschool child development within the community. Participants jointly prioritized the key problems requiring intervention.

The second session involved on designing intervention strategies. Stakeholders collaboratively determined the roles and responsibilities of parents, preschool teachers, healthcare professionals, VHVs, and community leaders. They also developed intervention activities, communication strategies, developmental monitoring procedures, and referral pathways appropriate to the local context. The final evaluated on reviewing the preliminary model, assessing its feasibility and practicality, identifying implementation barriers, and proposing revisions to improve its applicability and sustainability. Feedback from all stakeholder groups was incorporated to refine the final model before implementation. Finding from observations and reflections from Cycle 1 informed revisions to the intervention and guided planning for Cycle 2. The final community-based health promotion model was synthesized based on consensus among stakeholders. Before implementation, the model was evaluated by five experts for content validity, achieving a Content Validity Index (CVI) of 0.85, with a CVI of 0.80 or higher considered acceptable. This model was revised according to the recommendations of those experts and prepared in Table 1 before full implementation in Phase III.

Table 1. Components and implementation schedule of the community-based health promotion model

Timing	Component	Key activities
Week 1	Baseline assessment	Baseline demographic data; pretest assessment of parental knowledge and behaviors; baseline developmental assessment using the DSPM
Week 2	Parent education and skills training	Parent education and skills training; refresher training for preschool teachers
Weeks 3–7	Individualized developmental stimulation	Individualized DSPM-based developmental stimulation at preschool and home; first DSPM reassessment at Week 7
Week 11	Follow-up assessment and referral	Second DSPM reassessment; establishment of the parent support network; referral of children with persistent developmental delay
Weeks 3–16	Community-based support activities	Developmental monitoring; home environment guidance; experiential learning spaces; policy recommendations
Week 16	Post-intervention assessment	Posttest assessment of parental knowledge and behaviors; final developmental assessment using the DSPM

Note: The community-based activities implemented throughout Weeks 3–16 comprised four interrelated components: strengthening developmental monitoring and promotion, guidance on creating safe home environments, establishment of experiential learning spaces, and policy recommendations.

Phase III: Implemented and evaluated a program development: The implementation took place between August and November 2023. The model developed by the researchers was tested with a sample, divided into two groups: an experimental group (60 participants) and a control group (60 participants). The sample group consisted of parents and their children aged 2-5 years who had developmental delays and were receiving care from the Preschool Child Development Center in Roi Et province in 2023. The sample size was calculated by using G*Power.²⁰ The medium effect size was 0.50.²¹ A significance level (α) of 0.05, and a statistical power of 0.80. The calculation indicated that a minimum of 51 participants per group was required, yielding a total sample size of 102 participants. However, to ensure adequate statistical power and account for potential attrition during the study, the sample size was increased to 60 participants per

group, resulting in a total of 120 participants. This study employed a cluster-allocated quasi-experimental pretest–posttest control group design. Two child development centers with similar contextual characteristics were purposively selected. One center served as the experimental group, while the other served as the control group. Within each center, eligible children with developmental delays were selected using simple random sampling from the registration lists.

The control group received an active control intervention, consisted of routine developmental promotion program provided by the Preschool Children Development Center. During Week 1, researchers established rapport with parents, collected demographic data, conducted pretest assessments of parents' knowledge and behaviors related to preschool child health promotion, and assessed children's development using the DSPM. From Weeks 2 to 16, preschool teachers continued routine developmental stimulation according to the Ministry of Public Health's DSPM guidelines during weekdays and conducted home visits on weekends. Children's development was reassessed at the end of the study using the same assessment tool. Data collection for both groups was conducted over the same 16-week period.

The experimental group received the community-based health promotion program over a 16-week period. The intervention consisted of seven interrelated components developed through the participatory action research process. The implementation schedule and key activities are summarized in Table 1. Professional nurses coordinated the intervention in collaboration with preschool teachers, VHVs, community leaders, and parents. Individualized developmental stimulation was provided according to each child's developmental needs using the DSPM. Children's development was reassessed at Weeks 7 and 11 to monitor progress. Children who achieved age-appropriate developmental milestones continued routine developmental promotion, whereas those with persistent developmental delays received additional individualized stimulation and were referred to a pediatric developmental specialist for further evaluation and appropriate intervention. Throughout the intervention period, community-based activities, including developmental monitoring, home environment guidance, experiential learning spaces, and policy recommendations, were implemented to strengthen continuity and sustainability of developmental promotion.

Inclusion criteria

1. Parents who were the primary caregivers of children aged 2-5 years with developmental delays; were able to speak, read, write, and communicate in the Thai language, and were willing to participate in this study.
2. Children aged 2-5 years with developmental delays in at least one of the five developmental domains assessed by the DSPM assessment tool.

Exclusion Criteria

1. The parents had chosen to voluntarily withdraw themselves and their children from participating in this study.
2. Children who had been diagnosed with autism spectrum disorder or other neurodevelopmental disorders requiring specialized interventions.

3. Families who relocated or moved out of the study area during the study period, making follow-up assessments impossible.
4. Participants who attended fewer than 16 weeks and were therefore considered to have insufficient exposure to the intervention.

Data were collected using four instruments. The first instrument was a demographic questionnaire. Parents were asked about their gender, age, role as the primary caregiver, educational level, household income, and occupation. For children, information on birth order, date of birth, birth weight, and breastfeeding history was collected. **The second instrument was the Parental Knowledge Assessment Questionnaire,** which was developed by the researchers based on a review of the relevant literature to assess parents' knowledge of child development assessment and promotion. The questionnaire consisted of 20 items, including 10 items on developmental assessment and 10 items on developmental promotion. Each item was scored as 1 for a correct response and 0 for an incorrect response, with higher scores indicating greater knowledge. Parental knowledge scores were categorized into three levels using the Modified Bloom's cut-off criteria.²² scores of $\geq 80\%$ (16–20 points) indicated high knowledge, scores of 60–79% (12–15 points) indicated moderate knowledge, and scores of $< 60\%$ (0–11 points) indicated low knowledge. The questionnaire demonstrated good content validity (CVI = 0.87) and excellent internal consistency (KR-20 = 0.91). **The third instrument was the Parental Behavioral Assessment Questionnaire,** which was developed by the researchers based on a review of the relevant literature and the principles of the DSPM. The questionnaire assessed the frequency of parents' behaviors related to the assessment and promotion of preschool child development. It consisted of 25 items, including 13 items on developmental assessment and 12 items on developmental promotion. Responses were rated on a 5-point Likert scale. The scoring criteria were as follows: 0= Not at all, 1= rarely (1 day per week), 2= Sometimes (2-3 days per week), 3= Most of the time (4-6 days per week), and 4= Always (every day or 7 days per week). Parental behavioral scores were categorized into three levels using the Modified Bloom's cut-off criteria.²² scores of $\geq 80\%$ (80–100 points) indicated a high level of parental caregiving behavior, scores of 60–79% (60–79 points) indicated a moderate level, and scores of $< 60\%$ (0–59 points) indicated a low level. The questionnaire demonstrated good content validity (CVI = 0.90). It was pilot-tested with 30 participants who had characteristics similar to those of the study participants and demonstrated good internal consistency (Cronbach's $\alpha = 0.867$). **The fourth instrument was the Developmental Surveillance and Promotion Manual (DSPM).**²³ The DSPM has previously been used among Thai children aged 2–5 years.²⁴ The instrument demonstrated an Index of Item-Objective Congruence (IOC) greater than 0.50 and inter-rater reliability exceeding 0.80. Reported sensitivity and specificity were 96.04% and 64.67%, respectively. The DSPM assesses child development in five domains: gross motor (GM), fine motor (FM), receptive language (RL), expressive language (EL), and personal and social (PS) development.

Data Analysis

Based on Kemmis and McTaggart's methodology,¹⁹ the data analysis process was cyclical. Initial analysis of the data was conducted after each phase of the intervention. Findings were

reviewed and discussed with participants to gather feedback and refine subsequent phases during reflection meetings. This iterative process ensured that the analysis was continuously informed by participant insights and evolving research goals. Quantitative data were analyzed using descriptive statistics. Data distribution was tested using the Kolmogorov–Smirnov test. Changes in mean knowledge and behavioral scores before and after the intervention within each group were analyzed using paired t-tests, whereas between-group differences were analyzed using independent t-tests at a significance level of 0.05. Qualitative data were derived from interview and group discussion recordings, which were transcribed verbatim and analyzed using content analysis. This analysis involved presenting the details of the conversation by using multiple readings, identifying key issues, categorizing themes, and comparing themes across participants. Categories were refined to improve clarity, reduce redundancy, and ensure comprehensiveness through repetition until the data saturation was achieved. The credibility of the data was assessed using the triangulation method as follows: (1) Methodological triangulation: Data obtained from group discussions, in-depth interviews, and participatory observations were compared to enhance the credibility of the findings. (2) Investigator triangulation: Multiple researchers independently collected and analyzed the data. Data saturation was confirmed through regular discussions with community stakeholders and participants. Preliminary findings were returned to participants during reflection meetings for member checking and further refinement before finalizing the themes. Trustworthiness was established according to Lincoln and Guba's criteria,²⁵ including credibility, dependability, confirmability, and transferability.

Results

The findings are presented according to the study objectives, as follows:

1. Finding on the actual situation of health promotion for preschool children development

1.1 Finding from the quantitative component

Characteristics of Parents: The study included 120 participants. Slightly more than half of the parents were female (51.7%). Mothers were the primary caregivers in most families (95.0%). The majority of both fathers (55.0%) and mothers (58.3%) had attained a bachelor's degree. More than half of the families reported insufficient household income (57.5%), and most primary caregivers were employed (90.0%).

Characteristics of Preschool Children Aged 2–5 Years with Developmental Delay: Regarding the children's characteristics, most were first-born children (57.5%). The majority were born at term (90.8%), had a birth weight of 2,500 g or more (97.5%), and were breastfed after birth (97.5%).

The findings showed that most parents demonstrated a moderate level of knowledge (86.7%; mean = 13.49, SD = 1.37) and a moderate level of caregiving behavior (74.2%; mean = 77.03, SD = 3.21).

These quantitative findings were consistent with the qualitative data, which revealed limited parental knowledge and confidence in promoting child development, as well as inadequate continuity between home- and preschool-based developmental activities.

1.2 Finding from the qualitative component

Characteristics of participants: The study included 15 participants. The participants comprised two registered nurses, two preschool teachers, five VHVs, and six representatives of parents of children aged 2–5 years. The participants had a mean age of 51.46 years (SD= 7.51), and the majority were female (86.67%, n= 13). Most participants had completed secondary school or vocational education (66.67%, n= 10), while five participants (33.33%) held a bachelor's degree. The participants had an average of 7.67 years (SD= 2.16) of experience in child care and developmental promotion. Regarding occupation, the largest proportion were employed workers (53.33%, n = 8), followed by government officers or permanent employees (46.67%, n= 7).

Findings were defined into four major themes.

Theme 1: Limited parental knowledge and confidence in promoting child development

Parents demonstrated limited understanding of child development and developmental stimulation. Many believed that children would naturally achieve developmental milestones without active parental involvement and lacked confidence in implementing developmental activities at home.

“...Children are just children. They eat, go to school, and grow up. I didn't know they needed developmental stimulation...” (Focus group, Participant 2)

“...My child can only say a few words. I thought he would eventually start talking by himself...” (Participant 10)

Theme 2: Lack of continuity between home- and preschool-based developmental promotions

Participants described a discontinuity between developmental activities provided at Preschool Child Development Centers and those carried out at home. Parents often relied on teachers as the primary providers of developmental stimulation, resulting in inconsistent support after children returned home.

“...Teachers know how to teach them. At home, I don't know what activities I should do...” (Participant 7)

“...When my child comes home, we usually just let him play by himself...” (Participant 11)

Theme 3: Inadequate home and community environments for child development

Participants reported that the community lacked appropriate environments and resources to support children's development. Limited access to playgrounds, learning spaces, and family activity areas reduced opportunities for regular developmental stimulation.

“...There isn't a playground nearby, so my child mostly stays at home watching TV...”(Participant 1)

“...We don't have any place where parents and children can do activities together...”(Participant 5)

Theme 4: Limited monitoring and follow-up of child development

Parents and community stakeholders expressed concerns about the absence of continuous monitoring, follow-up, and developmental evaluation after children returned home, making it difficult to identify developmental problems early and provide timely intervention.

“...No one follows up after the screening unless the child has a serious problem...”(Focus group, participant 5)

“...We don't know whether we are stimulating our child correctly because no one checks or gives us feedback...” (Focus group, participant 9)

2. Findings on the community-based health promotion model for preschool children

The community-based health promotion model for preschool children, developed through the PAR process of Kemmis and McTaggart¹⁹, consisted of seven components. 1) Parent education and skills training to enhance parents' knowledge and practical skills in assessing and promoting preschool child development. 2) Individualized developmental activity planning by professional nurses to stimulate child development and strengthen parental involvement. 3) Establishment of community-based parent support networks led by community leaders to strengthen collaboration and ensure continuity of care between homes and Preschool Children Development Centers. 4) Strengthening the continuity and sustainability of developmental monitoring and promotion at Preschool Child Development Centers. 5) Guidance for parents on creating safe home environments that foster child development, such as arranging safe and quality play corners and toys in their homes, preventing accidents, assisting choking children, and training basic self-help skills for parents of preschool children. 6) Establishment of experiential learning spaces in Preschool Children Development Centers, including storytelling libraries, kitchen and cooking areas, small learning pools, and learning stations for self-help skills, road safety, and choking prevention. 7) Policy recommendations for administrators of Preschool Children Development Centers to establish intergenerational three-age centers integrating services for children, adults, and older adults. The proposed centers also included activities for parents and grandparents while children participated in developmental programs.

3. Finding on the implementation of the community-based health promotion model for preschool children in Roi Et Province

3.1 Demographic characteristics

The participants consisted of 120 parents and their preschool children. In the experimental group, the majority of parents were female, accounting for 51.70%. The average age was 41.21 years (SD= 6.24). Primary caregivers were mostly mothers, accounting for 93.30%. 50.00% of fathers had a bachelor's degree, while 60.00% of mothers had a bachelor's degree. 56.70% reported insufficient income. For preschool children, 56.70% were the first-born child in the family, 90.00% were born at term, and 96.70% weighed over 2500 grams at birth. Additionally, 96.70% received breastfeeding following birth.

In the control group, most of the parents were female, comprising 55.00%. The average age was 41.00 years (SD= 6.43). Primary caregivers were mostly mothers (96.70%). 60.00% of fathers and 56.70% of mothers had a bachelor's degree. 58.0% reported insufficient income. For preschool children, 58.30% were the first-born child in the family, 91.70% were born at term, and 98.30% weighed over 2500 grams at birth. Additionally, 98.30% received breastfeeding following birth. There were no significant differences in the baseline demographic characteristics of participants between the experimental and control groups ($p > .05$).

3.2 Comparing of parental knowledge and parental caregiving behavior scores within and between the groups

The comparison of the average score of parental knowledge and parental caregiving behavior at before and after the implementation of model development. ($n= 120$) as shown in Table 2, the comparison of the average score of parental knowledge and parental caregiving behavior between experimental ($n= 60$) and control group ($n= 60$) at before and after the implementation of program development as shown in Table 3.

Table 2. Parental knowledge and parental caregiving behavior scores within groups

Variables	Mean (SD)		Mean diff.	95%CI	P value
	Before implementation	After implementation			
Parental knowledge					
Experimental group	13.55(1.38)	17.03(1.07)	3.48	3.10, 3.86	<0.001
Control group	13.43(1.36)	13.63(1.35)	0.20	0.05,0.34	0.009
Parental caregiving behavior					
Experimental group	77.13(3.25)	90.53(3.43)	13.40	12.31,14.48	<0.001
Control group	76.93(3.19)	77.03(3.11)	0.01	-0.17,0.37	0.471

Note: Paired t-test; Possible parental knowledge score: 0–20; Possible parental caregiving behavior score, 0–100.

Table 3. Parental knowledge and parental caregiving behavior scores between groups

Variables	Mean (SD)		Mean diff.	95%CI	P value
	Experimental group	Control group			
Parental knowledge					
Before implementation	13.55(1.38)	13.43 (1.36)	0.12	-0.38,0.61	0.643
After implementation	17.03(1.07)	13.63(1.35)	3.40	2.95,3.84	<0.001
Parental caregiving behavior					
Before implementation	77.13(3.25)	76.93(3.19)	0.20	-0.96,1.36	0.735
After implementation	90.53(3.43)	77.03(3.11)	13.50	12.31,14.68	<0.001

Note: Independent t-test; Possible parental knowledge score: 0–20; Possible parental caregiving behavior score, 0–100

3.3 Comparison of developmental assessment results between groups

A comparison of developmental status after the intervention between the experimental and control groups revealed a statistically significant difference ($\chi^2 = 11.39$, $p < .001$). Following the intervention, developmental status differed significantly between the experimental and control groups ($\chi^2 = 11.39$, $p < .001$). A higher proportion of children in the experimental group achieved age-appropriate development than those in the control group (88.3% vs. 61.7%). Conversely, fewer children in the experimental group continued to exhibit developmental delay compared with the control group (11.7% vs. 38.3%), as shown in Table 4.

Table 4. Developmental status after implementation

Developmental status after implementation	Group		χ^2	P value
	Control (n=60) n (%)	Experimental (n=60) n (%)		
Delayed development	23 (38.30)	7 (11.70)	11.39	<0.001
Age-appropriate development	37 (61.70)	53 (88.30)		

Note: Pearson's chi-square test.

3.4 Qualitative data after implementation the model development

The analysis of qualitative data was defined into 3 themes.

Following implementation of the model, parents reported greater knowledge and confidence in supporting their children's development. They described applying practical strategies in daily

life, including age-appropriate nutrition, sleep routines, communication, storytelling, play activities, positive discipline, and encouraging children to participate in household chores.

“...Now I know how to play with my child to promote development. We read stories together every night and spend more time talking...” (Parent 6)

“...Before joining the program, I thought my child would develop naturally. Now I understand that I need to stimulate development every day...” (Parent 12)

These findings were consistent with the quantitative results, which showed significant improvements in parental knowledge and parenting behavior following the intervention ($p < 0.001$).

Theme 2: Family-centered developmental support integrated into daily routines

Parents reported that the recommended activities were practical and compatible with their daily routines, making it easier to continuously promote child development at home.

“..The activities are easy to do at home. We can play, tell stories, and let our child help with simple household tasks every day...” (Parent 9)

Theme 3: Strengthened community support and continuity of developmental monitoring

Participants emphasized that regular home visits, follow-up support from local administrative organizations, and communication through the LINE group increased their confidence and motivation to continue developmental promotion. Continuous monitoring also enabled parents to seek advice whenever problems arose.

“..The staff visited regularly and answered our questions through the LINE group, so I felt confident that I was doing the activities correctly...” (Parent 15)

These qualitative findings complemented the quantitative results by demonstrating how increased parental support, confidence, and continuous follow-up contributed to improvements in children's developmental outcomes, with a significantly higher proportion of children achieving age-appropriate development in the experimental group than in the control group ($p < 0.001$).

Discussion

The community-based health promotion model for preschool children in this study was developed through community participation. However, several issues are discussed below.

1. Barriers to Preschool Children Development Promotion in the Community. Our qualitative findings revealed that parents lacked knowledge and confidence in promoting their children's development independently, resulting in an overreliance on Preschool Child Development

Centers for developmental support. These findings were further supported by our quantitative results, which showed that most parents had only moderate levels of knowledge (86.7%) and parenting behaviors (74.2%). The findings also indicated a lack of systematic and continuous developmental promotion between the home and Preschool Child Development Centers, limiting opportunities for consistent developmental stimulation. Similar findings have been reported in previous studies showing that inadequate parental knowledge and limited responsive caregiving practices reduce parents' ability to provide effective developmental stimulation at home.²⁶ Furthermore, the WHO Guideline²⁷ on Responding to Children at Risk of Developmental Difficulties highlights that parenting interventions focusing on caregiver knowledge, responsive caregiving, and early learning opportunities significantly improve parenting practices and child developmental outcomes, particularly in low- and middle-income countries. In addition, the absence of supportive community environments, such as safe play spaces and opportunities for family engagement, may further restrict children's developmental experiences. These findings are consistent with the Nurturing Care Framework, which emphasizes that responsive caregiving, opportunities for early learning, and supportive home and community environments are essential for optimal early childhood development.²⁸ Supportive physical environments also play an important role in promoting children's development. Previous studies have highlighted the importance of providing supportive outdoor play environments that promote children's exploration, physical activity, and learning. However, limited knowledge among caregivers and educators regarding the effective use of these environments may reduce opportunities for developmental stimulation.²⁹

2. The community-based health promotion model for preschool children in this study covers 5 aspects of child development, including: gross motor: fine motor: receptive language: expressive language: and personal and social development. This is facilitated through various processes including: 1) parent education and skills training, 2) individualized developmental activity planning, 3) establishment of community-based parent support networks, 4) strengthening the continuity and sustainability of developmental monitoring and promotion at Preschool Child Development Centers, 5) guidance on creating safe home environments and promoting child development, 6) establishment of experiential learning spaces within Preschool Child Development Centers, and 7) policy recommendations. Through the involvement of staff and community network stakeholders, this model drives successful health promotion initiatives. A highlight of the model that parents feel were supported and promoted by the network of community professional nurses and preschool teachers to be able to play their role in promoting child development at home continuously. Similarly, family-centered care interventions can provide optimal stimulation for development in a safe, stable and nurturing environment.³⁰ In addition, family and community should promote parental interactions through reading and playing with young children.³¹ Similarly, evidence from rural Thailand indicates that parental involvement, time investment, and supportive preschool environments play important roles in improving children's developmental outcomes, highlighting the importance of strengthening collaboration among families, preschool child development centers, and communities.³²

Therefore, it is crucial to enact policies and interventions aimed at reducing the impact of these risk factors.³³ However, Multi-sectoral policies to support child development in low socio-economic households should be strengthened.³¹

3. The effectiveness of the implementation using a community-based health promotion model for preschool children.

The present findings suggest that the community-based health promotion model effectively improved parental knowledge, parenting behaviors, and developmental outcomes among preschool children with developmental delays. Rather than reflecting the effect of education alone, these improvements were likely attributable to the integration of multiple complementary components within the model. Parent education and skills training enhanced parents' understanding of child development and developmental stimulation, while individualized developmental activity planning enabled parents to apply this knowledge in daily caregiving. In addition, continuous follow-up through Preschool Child Development Centers, community-based parent support networks, and experiential learning opportunities reinforced parents' confidence, encouraged sustained behavioral changes, and promoted consistent developmental stimulation in the home environment. These mechanisms are consistent with evidence from systematic reviews demonstrating that multicomponent parenting interventions combining parent education, skills training, responsive caregiving, and ongoing support improve parenting practices and promote early childhood development.²⁶

The behavioral improvements observed among parents may also be explained by the participatory nature of the intervention. Parents actively participated in planning and implementing developmental activities, received regular feedback from healthcare professionals, and shared experiences with other parents within the community. These strategies are consistent with adult learning theory, which emphasizes experiential learning, active participation, and reflection as key processes that facilitate knowledge acquisition and its translation into practice.³⁴ Furthermore, regular feedback, peer support, and ongoing collaboration with healthcare professional's likely enhanced parental self-efficacy, an important determinant of sustained behavioral change as described in Bandura's Social Cognitive Theory.³⁵ The continuity of support between families, healthcare providers, and Preschool Child Development Centers therefore strengthened parents' confidence and their ability to integrate developmental promotion into everyday routines.

The improved developmental outcomes observed among preschool children are likely a consequence of these behavioral changes. When parents acquired appropriate knowledge, gained practical skills, and consistently provided individualized developmental stimulation at home, children had greater opportunities to practice age-appropriate motor, language, cognitive, and social skills in their natural environments. These findings are consistent with previous studies demonstrating that parent-focused developmental interventions can significantly improve language development among preschool children, particularly in receptive and expressive language domains.³⁶ Likewise, psychosocial interventions have been shown to enhance cognitive development during early childhood.³⁷ These findings further support recommendations

emphasizing the importance of early identification of developmental delays and timely intervention through developmental screening programs to reduce adverse outcomes throughout childhood and later adulthood.³⁸

The findings also highlight the importance of adopting a community-based approach to developmental promotion. The collaboration among parents, healthcare professionals, Preschool Child Development Centers, and community stakeholders created a supportive environment that facilitated sustained parental engagement and continuity of developmental care. This integrated approach extends beyond improving parental knowledge by strengthening the social and organizational support necessary for maintaining positive parenting practices. Nevertheless, sustaining these benefits over the long term will require continued community participation, ongoing professional support, and integration of the model into routine health and education services. Without these supportive mechanisms, improvements in parental knowledge, behaviors, and children's developmental outcomes may gradually decline. This interpretation is consistent with previous evidence indicating that community-based interventions provide an effective strategy for promoting health and preventing disease when supported by sustained community engagement and health system integration.³⁹ Similarly, previous research has emphasized that sustainable early childhood development depends on strong multisectoral collaboration, active community participation, and locally responsive governance structures that support coordinated actions among families, healthcare providers, educational institutions, and community stakeholders.⁴⁰

Implications for Practice

The community-based health promotion model may be applied in other communities; however, adaptation should be based on a comprehensive assessment of local needs, available resources, workforce capacity, and socio-economic conditions. Successful implementation requires collaboration among parents, preschool child development centers, healthcare professionals, local administrative organizations, and community stakeholders to ensure continuous developmental monitoring and support. The model may also strengthen parents' knowledge, confidence, and engagement in promoting child development through coordinated community-based services.

Future Research Directions

Future studies should evaluate the community-based health promotion model in diverse geographical, cultural, and socio-economic settings to determine its adaptability and generalizability. Pilot implementation in both urban and rural communities is recommended to assess the feasibility of adapting the model to different contexts while considering local needs and available resources. In addition, longitudinal studies are needed to examine whether improvements in child development and parental behaviors are sustained over time and to evaluate the long-term impact of the model on community engagement and child developmental outcomes.

Conclusion

Parents of preschool children with developmental delays demonstrated insufficient knowledge and confidence in promoting child development, together with discontinuity between home and Preschool Child Development Centers, inadequate developmental environments, and limited developmental monitoring. The community-based health promotion model developed in this study improved parental knowledge, parental caregiving behaviors, and developmental outcomes among preschool children. Therefore, the model may serve as a practical approach for strengthening collaboration among families, healthcare professionals, Preschool Child Development Centers, and community stakeholders to support sustainable developmental promotion for preschool children. Future studies should evaluate the long-term sustainability of the model and examine its applicability in other communities with different geographical, cultural, and socioeconomic contexts.

Study limitation

This study has several limitations that should be considered when interpreting the findings. First, the study was conducted in rural communities within a single province in northeastern Thailand; therefore, the findings may not be generalizable to other geographical, cultural, or healthcare settings. Second, although the intervention demonstrated significant short-term improvements in parental knowledge, caregiving behaviors, and children's developmental outcomes, the absence of long-term follow-up limited the evaluation of the sustainability of these effects. Third, because the study employed a cluster-allocated quasi-experimental design involving two Preschool Children Development Centers, contamination between groups through informal communication among parents or community members could not be completely excluded. Fourth, outcome assessors were not blinded to group allocation, which may have introduced assessment bias. Fifth, parental knowledge and behavioral outcomes were measured using self-reported questionnaires and may therefore have been influenced by social desirability or recall bias. Finally, allocation was performed at the center level rather than through individual randomization, which may have introduced selection bias despite the similarity of baseline characteristics between the two groups.

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Conflict of Interest

The authors declare no conflict of interest.

Data Availability

Further data set could be obtained on request if required through corresponding author with email: toycharoensaen@reru.ac.th

Ethical Issues

This study was approved by the Human Research Ethics Committee of Roi Et Rajabhat University (Approval No. 007/2566). Written informed consent was obtained from all participants prior to enrollment. Before data collection, the researchers explained the study objectives, procedures, potential benefits and risks, and informed participants that their participation was voluntary and that they could withdraw from the study at any time without any consequences. Participants' privacy and confidentiality were strictly maintained by anonymizing all collected data and restricting access to the research team.

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Research Highlights

What is the current knowledge?

- In rural Thai communities, systematic approaches to preschool children developmental promotion are lacking, leaving parents without adequate guidance or support.
- Children with developmental delays often receive inconsistent stimulation due to a disconnect between home environments and Preschool Children Development Centers.
- The absence of community-based tracking and follow-up systems further limits early identification and intervention for at-risk children.

What is new here?

- A co-designed, community-based health promotion model was developed through participatory action research, integrating multi-stakeholder collaboration across home, school, and community settings.
- Following model implementation, parents in the experimental group showed significantly greater improvements in knowledge and developmental promotion behaviors compared to the control group.
- Children with developmental delays in the experimental group demonstrated significantly greater developmental progress, highlighting the effectiveness of sustained, community-driven intervention.

References

1. Thaineua V, Sirithongthaworn S, Kanshana S, Isaranurak S, Karnkawinpong O, Benjaponpitak A, et al. A 9-year retrospective cohort study of the monitoring and screening of childhood developmental delay in Thailand. *Child Care Health Dev.* 2024;50(2):e13233. doi:10.1111/cch.13233.
2. Smith AJ, Powell AC, Chang MS, Ganga E, Tanyayiwa HM, Walker PS. A cluster randomised controlled trial of an early childhood parenting programme delivered through early childhood education centres in rural Zimbabwe. *Child Care Health Dev.* 2024; 50(1): e13189. doi:10.1111/cch.13189
3. Meriem C, Khaoula M, Ghizlane C, Asmaa MA, Ahmed AOT. Early childhood development (0-6 years old) from healthy to pathologic: A review of the literature. *Open J Med Psychol.* 2020;9:100-122. doi:10.4236/ojpm.2020.93009
4. Gilmore JH, Knickmeyer RC, Gao W. Imaging structural and functional brain development in early childhood. *Nat Rev Neurosci.* 2018;19(3):123-37. doi:10.1038/nrn.2018.1
5. Metwally AM, Abdallah AM, Salah El-Din EM, Khadr Z, Raouf ERA, Elghareeb NA, et al. A national prevalence and profile of single and multiple developmental delays among children aged from 1 year up to 12 years: An Egyptian community-based study. *Child Adolesc Psychiatry Ment Health.* 2022;16(1):63. doi:10.1186/s13034-022-00498-3
6. Del Tufo SN, Earle FS, Cutting LE. The impact of expressive language development and the left inferior longitudinal fasciculus on listening and reading comprehension. *J Neurodev Disord.* 2019;11(1):37. doi:10.1186/s11689-019-9296-7

7. Alghamdi HM, Altirkistani BA, Baatya RA, Marghalani YO, Alshaikh NM. Bridging the gap: Parents' knowledge of childhood developmental milestones and the early identification of children with developmental delay. *Cureus*.2023;15(11):e48232. doi:10.7759/cureus.48232
8. Global Research on Developmental Disabilities Collaborators. Accelerating progress on early childhood development for children under 5 years with disabilities by 2030. *Lancet Glob Health*. 2022;10(3):e438-44. doi:10.1016/S2214-109X(21)00488-5
9. Global Research on Developmental Disabilities Collaborators. Developmental disabilities among children younger than 5 years in 195 countries and territories, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet Glob Health*. 2018;6(10):e1100-21. doi:10.1016/S2214-109X(18)30309-7
10. Chattopadhyay N, Aneja S. The status of early childhood development in India: will we reach the countdown to 2030 targets. *Indian Pediatr*. 2021;58(Suppl. 1):S4-S10. doi:10.1007/s13312-021-2348-6
11. Roi Et Provincial Public Health Office. Report on the results of the child development survey in 2023 [Internet]. Roi Et: Roi Et Provincial Public Health Office; 2023 [cited 2024 Dec 28]. Available from: <https://sasuk101.moph.go.th/>
12. Frosch AC, Schoppe-Sullivan JS, O'Banion DD. Parenting and child development: a relational health perspective. *Am J Lifestyle Med*. 2021;15(1):45-59. doi:10.1177/1559827619849028
13. Alhayli MR, Alhayli AA, Alamri SM, Alamri AM, Alfaifi JA, AlRashdi MH, et al. Parental knowledge, attitude, and practice toward children's developmental milestones in the Western Region of Saudi Arabia. *Cureus*. 2024;16(1):e52413. doi:10.7759/cureus.52413
14. Yaoyao F, Abd Hamid J, Tham J. The influence of parenting factors on parent-child attachment and young children's autonomy in Jiangxi Province, China. *J Res Adm*. 2024;6(1):1-23. Available from: <https://journlra.org/index.php/jra/article/view/1460>
15. Trojan A, Lorentz C, Nickel S. Participation as a core principle of community health promotion: General account and examples. In: *Community Health Promotion* [Internet]. London: IntechOpen; 2023 [cited 2026 Jun 28]. doi:10.5772/intechopen.111930. Available from: <https://doi.org/10.5772/intechopen.111930>
16. Hongsopa W. Development of a parental knowledge model for early childhood: A case study of Wang Bua Samakkhi School, Kantharawichai District, Maha Sarakham Province, Maha Sarakham University. *Journal of Education*. 2020;14(2):210-25. (in Thai).
17. Haldane V, Chuah FLH, Srivastava A, Singh SR, Koh GCH, Seng CK, et al. Community participation in health services development, implementation, and evaluation: A systematic review of empowerment, health, community, and process outcomes. *PLoS One*. 2019;14(5):e0216112. doi: 10.1371/journal.pone.0216112
18. Chaichanasang T, Chantanam W, Hormoon U, Phitsanupak H, Srisong P. Potential of communities in promoting early childhood development: Participatory action research. *Journal of The Royal Thai Army Nurses*. 2021;22(2):451-59. (in Thai).

19. Kemmis S, McTaggart R. The action research planner. 3rd ed. Victoria: Deakin University Press; 1988.
20. Faul F, Erdfelder E, Lang AG, Buchner A. G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behav Res Methods. 2007;39(2):175-91. doi:10.3758/BF03193146
21. Cohen J. Statistical power analysis for the behavioral sciences. 2nd ed. Hillsdale (NJ): Lawrence Erlbaum Associates; 1988.
22. Bloom BS, editor. Taxonomy of educational objectives: The classification of educational goals. Handbook I: Cognitive domain. New York: Longmans, Green; 1956.
23. Nwonkham P. Development of early childhood development promotion models at early childhood development centers in Mae Hong Son Province. Journal of Community Public Health. 2017;12(1):36-45. (in Thai).
24. Tappamalai K. Development of early childhood development promotion models at early childhood development centers in Suphanburi Province. Journal of Health Center 9. 2018;29(12):5-19. (in Thai).
25. Lincoln YS, Guba EG. Naturalistic Inquiry. Newbury Park, CA:SAGE Publications; 1985.
26. Jeong J, Franchett EE, Ramos de Oliveira CV, Rehmani K, Yousafzai AK. Parenting interventions to promote early child development in the first three years of life: A global systematic review and meta-analysis. PLoS Med. 2021;18(5):e1003602. doi:10.1371/journal.pmed.1003602.
27. World Health Organization. *WHO guideline on responding to children at risk of developmental difficulties* [Internet]. Geneva: World Health Organization; 2023 [cited 2026 Jun 28]. Available from: <https://www.who.int/publications/i/item/9789240073628>
28. Britto PR, Lye SJ, Proulx K, Yousafzai AK, Matthews SG, Vaivada T, et al. Nurturing care: promoting early childhood development. Lancet. 2017;389(10064):91-102. doi:10.1016/S0140-6736(16)31390-3
29. Smedsrud TM, Kleppe R, Lenes R, Moser T. Early childhood teachers' support of children's play in nature-based outdoor spaces: a systematic review. Educ Sci (Basel). 2024;14(1):13. doi:10.3390/educsci14010013
30. Smythe T, Zuurmond M, Tann CJ, Gladstone M, Kuper H. Early intervention for children with developmental disabilities in low- and middle-income countries: the case for action. Int Health. 2021;13:222-31. doi:10.1093/inthealth/ihaa044
31. Topothai T, Suphanchaimat R, Topothai C, Tangcharoensathien V, Cetthakrikul N, Waleewong O. Thailand achievement of SDG indicator 4.2.1 on early child development: an analysis of the 2019 Multiple Indicator Cluster Survey. Int J Environ Res Public Health. 2022;19:7599. doi:10.3390/ijerph19137599
32. Chujan W. Child development, parental investments, and school environment: evidence from rural Thailand. Southeast Asian J Econ. 2024;12(2):61-92.
33. Choudhary P, Chakrabarty B. Approach to developmental delay: a developing world perspective. Prev Med Res Rev. 2024;1(1):16-20. doi:10.4103/PMRR.PMRR_67_23

34. Kolb DA. *Experiential learning: Experience as the source of learning and development*. 2nd ed. Upper Saddle River (NJ): Pearson Education; 2015.
35. Bandura A. *Self-efficacy: The exercise of control*. New York (NY): W.H. Freeman; 1997.
36. Vermeij BAM, Wiefferink CH, Knoors H, Scholte RHJ. Effects in language development of young children with language delay during early intervention. *J Commun Disord*. 2023;103:106326. doi:10.1016/j.jcomdis.2023.106326
37. Mamedova K, Laurenzi AC, Gordon S, Tomlinson M, Fearon P. Identifying the common elements of early childhood interventions supporting cognitive development in low- and middle-income countries. *Advers Resil Sci*. 2024;5:55-79. doi:10.1007/s42844-023-00105-0
38. Almahmoud HO, Abushaikha L. Developmental delay and its demographic and social predictors among preschool-age children in Palestine. *J Pediatr Nurs*. 2024;74:101-9. doi:10.1016/j.pedn.2023.11.023
39. Nickel S, von dem Knesebeck O. Effectiveness of community-based health promotion interventions in urban areas: a systematic review. *J Community Health*. 2020;45(2):419-34. doi:10.1007/s10900-019-00733-7
40. Wariloon A, Boonsawasdgulchai P. Community-based approaches to enhancing early childhood development quality in rural northeastern Thailand: a critical ethnographic study. *Pac Rim Int J Nurs Res*. 2025;29(4):790-809. doi:10.60099/prijnr.2025.274388