

Original Article

Effects of Parent-Implemented Intervention for Thai Children with Language Impairment: A Randomized Controlled Trial

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Purpose Many studies have reported the effect of parent-implemented interventions in the treatment of language impairment (LI). This study aimed to compare the effects of parent-implemented enhanced milieu teaching (EMT) using the Teach-Model-Coach-Review (TMCR) model with general language stimulation on language skills and health-related quality of life (HRQOL) of Thai children with LI.

Methods This study was a single-blind randomized controlled trial (RCT). Sixty Thai children with LI were randomly assigned to one of two interventions: parent-implemented EMT using the TMCR model or general language stimulation.

Results A total of 57 participants were included in the analyses. After two months of intervention, there were no significant differences on combined language quotients (CLQ; $p = 0.24$) and total HRQOL summary score ($p = 0.75$), between the children in the intervention and control groups. Compared with the control group, children in the intervention group had higher language scores at two months.

Conclusions Parent-implemented EMT using the TMCR model is not significantly better than general language stimulation. The two groups of children gained in language skills and in HRQOL. However, children in the intervention group had higher language scores at two months; hence, parent-implemented intervention may be regarded as one of the effective language interventions for children with LI, including SLI and GDD, and their parents in the Thai context.

Keywords Parent-implemented, Enhanced milieu teaching, Language impairment, Health-related quality of life, Randomized controlled trial

INTRODUCTION

Language impairment (LI) refers to impairments in comprehension and/or using spoken, sign, and/or written language. LI may relate to a deficit in phonology, morphology, syntax, and language pragmatics [1]. Empirical literature has reported that LI can have an impact on children's HRQOL in terms of physical, psychological, emotional, social, and school functioning [2-5]. We considered speech therapy services to be considered for the treatment of children with LI, since they help to prevent and ameliorate the limitations that children face in terms of QOL [6,7].

Traditionally, a therapist-centered intervention model

has been the dominant method used in intervention services [8]. General language stimulation is a set of interaction strategies that involve changes in the physical and linguistic environments that increase overall language skills and the language-learning opportunities for children to hear adult models of language and encourages the children to use verbal language communication through social interaction that is appropriate to the child's current level of language learning. This approach consists of recast, parallel talks, modeling, and expansion [9]. Robertson and Weismer [9] showed that children who received a therapist-centered intervention model demonstrated an increase in vocabulary, intelligibility, and socialization. General language stimulation is a traditional practice im-

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plemented by a speech-language pathologist at a medical-base, developmental and behavioral pediatrics clinic in Thailand. However, this approach limited involvement with parents in services, and there is no study on general language stimulation within the Thai context.

Currently, parental involvement in the therapy process occurs on a continuum from the traditional therapist-centered model of intervention to a family-centered practice [10]. Parent-implemented intervention consists of professionals collaborating to train and coach parents to implement specific language support strategies with their children in daily activities and in natural settings such as homes or neighborhoods through a structured parent training program so as to increase positive learning opportunities and acquisition of language and communication skills for the children [11-13].

Parent-implemented enhanced milieu teaching (EMT) is one of the most common parent training programs for children with LI. This approach is a cascading model of intervention, where a therapist provides training to the parents. The parent then uses language support strategies with the children, which in turn improves the children's use of language and communication [17]. EMT is a conversation-based model of early language intervention that uses child interest and initiations as an opportunity to model and prompt language in everyday contexts [14]. EMT consists of matched turns, modeling and expansions, time delays and milieu teaching prompts [15,16].

This approach consists of matched turns, modeling and expansions, time delays, and milieu teaching prompts [15,16]. First, matched turns are non-verbal or verbal language support strategies in which an adult matches conversational turns with the child by using 1) mirroring and mapping as a way to connect and match their communicative turns or when children are not talking or 2) equal verbal turn-taking or adults pace their verbal turns when children are verbalizing, so they are matched to the child's turns by verbal response. Second, modeling and expansions are adult models that make use of specif-

ic language targets suitable for the child's language ability to respond to the child's communication and are related to the child's play and emphasis on interest modeling and responsive interaction. Modeling provides children with salient, specific models of targeted language forms in interactions with adults. Expansions are a powerful language learning strategy that adults can use to support children's language complexity (diversity of vocabulary, mean length of utterances). Third, time delays are nonverbal language support strategies in which the adult waits expectantly for the child to attempt communication in order to elicit independent verbal or nonverbal requests from the child. The strategy should be followed by an adult labeling these requests with a specific target language. Fourth, milieu teaching prompts are procedures that include modeling the verbal behavior of the child, mand-modeling appropriate verbal behavior, using time delay, and incidental teaching. These strategies are clearly taught in this order, as each successive strategy builds on the previous strategy. The adult responds to the child's needs with prompts by offering access to the requested objects and verbal feedback for communication to develop the child's targeted language skills and functional reinforcement of its production of prompted target forms.

In addition, parent-implemented EMT includes the TMCR for parent instruction. TMCR, developed by Kaiser and Roberts [17], is taught to parents using a training method along with EMT. This method optimizes parents' learning of how to sequentially use specific language support strategies with their young children [17]. This parent instruction consists of teaching, modeling, coaching, and reviewing [17]. First, the teaching consists of two components. The first is a one-on-one workshop described by the therapist, provides a rationale behind, and demonstrates the strategies being learned. The second component of the teaching element occurred at the beginning of each intervention session. The therapist reviews the strategy with the parent, models the strategy, and roleplays with the parent to ensure that the latter has a proper under-

standing of the strategy. Second, the model occurs immediately after the teaching element at the beginning of each session. During modeling, the therapist interacts directly with the child while verbally demonstrating to the parent the strategy used without breaking the child's attention. Third, the coach appears after the therapist finishes modeling the strategy with the child. At this stage, the parent takes over the interaction with the child, as the therapist watches and offers constructive feedback through verbal coaching and provides specific praise related to the intervention strategies. Fourth, a review is a discussion that takes place between the therapist and the parent after the parent practices with the child. The therapist asked open-ended questions to elicit responses from parents. The therapist responds to these responses and summarizes the parents' use of skills while linking their behavior to the child's behavior.

Many studies have reported the effect of parent-implemented EMT using the TMCR model for the treatment of LI, with mixed results [15,16,18-20]. A study by Hampton et al. [20] found that children who received the intervention did not differ from those who did not receive the intervention at 6- and 12-month follow-ups. They remained delayed in their receptive and expressive language skills throughout the follow-up period. Furthermore, caregivers did not maintain the use of all EMT strategies at the established fidelity levels. However, the majority of studies found mostly positive child outcomes in terms of language development, as well as positive effects on parent outcomes in clinical and/or home settings [15,16,18,19].

In contrast to its wide use in American culture [15-21], there has been no local study on parent-implemented EMT using the TMCR model carried out on the Asian community, specifically Thailand. Furthermore, some studies have used small participants [15,16,18]. There have been several RCTs [18-20]. Only one study compared children who underwent EMT to those who received standard community intervention [21]. Importantly, most studies have examined the beneficial effects of parent-im-

plemented EMT using the TMCR model in terms of language skills [15-20], but none study exists with regards to how this language intervention effect on children's HRQOL.

This study aims to examine the effects of parent-implemented EMT using the TMCR model with general language stimulation on language development and the HRQOL of Thai-speaking children with LI. In this study, the researchers hypothesized that a) children with LI who receive parent-implemented EMT using the TMCR model have better language outcomes than those who receive general language stimulation, and b) children with LI who receive parent-implemented EMT using the TMCR model have better HRQOL than those who receive the general language stimulation.

METHODS

Research design

This present study was a single blind randomized controlled trial conducted (two interventions) study at a medical-base, Developmental and Behavioral Pediatrics Clinic in Thailand between October 2019 to October 2020.

Participants

The participants of the study were 60 children with LI and their parents (see Table 1 for specific participant characteristics at baseline). Children were included in the study if they a) spoke Thai as the primary language b) were aged between 24 and 48 months at the time of the first assessment, and c) had been diagnosed and confirmed by a developmental-behavioral pediatrician as having specific language impairment (SLI) or global developmental delay (GDD), according to the International Classification of Diseases, Tenth Edition (ICD-10). Children were excluded from the study if they a) had been diagnosed with autism spectrum disorder, b) had any specific disabilities

Table 1. Participant Characteristics at Baseline

Demographics	Intervention (n=30)	Control (n=30)	p-value*
	Frequency (Percentage)	Frequency (Percentage)	
Child			
Gender			
Male	14 (46.7)	19 (63.3)	0.194
Female	16 (53.3)	11 (36.7)	
Age mean ± SD, mo	2.65 ± 0.56	2.70 ± 0.61	0.729
2.0–3.0	22 (73.3)	21 (70.0)	0.774
3.1–4.0	8 (26.7)	9 (30.0)	
Diagnosed			
SLI	20 (66.7)	20 (66.7)	1.000
GDD	10 (33.3)	10 (33.3)	
Additional speech therapy service	0 (0)	0 (0)	N/A
Additional services received in the last three months (e.g., EI, OT)	11 (36.7)	6 (20.0)	0.152
Parent			
Family Role			
Mother	22 (73.3)	19 (63.3)	0.727
Father	3 (10.0)	4 (13.3)	
Other (e.g., grandfather, grandmother, or aunt)	5 (16.7)	7 (23.3)	
Age mean ± SD, year	34.40 ± 9.69	38.29 ± 12.95	0.193
≤ 30	10 (33.3)	11 (36.7)	0.787
> 30	20 (66.7)	19 (63.3)	
Education			
≤ Primary School	5 (16.7)	2 (6.7)	0.377
High School/Vocational Certification	17 (56.7)	16 (53.3)	
≥ Bachelor's degree	8 (26.7)	12 (40.0)	
Marital Status			
Single	1 (3.3)	0 (0.0)	0.492
Married	29 (96.7)	28 (93.3)	
Separated/Divorce/Widowed	0 (0.0)	2 (6.7)	
Employment			
Non-employed	20 (66.7)	19 (63.6)	1.000
Full-time	9 (30.0)	10 (33.3)	
Part-time	1 (3.3)	1 (3.3)	
Occupation			
Housewife/husband	20 (66.7)	19 (63.0)	0.537
Civil servant/state enterprise employee/private company employees	4 (13.3)	7 (23.3)	
Self-employed/merchant/laborer/other	6 (20.0)	4 (13.3)	
Income (monthly)			
No income	20 (66.7)	19 (63.3)	0.864
≤ 25,000	5 (16.7)	7 (23.3)	
> 25,000	5 (16.7)	4 (13.3)	
Family Income (monthly)			
≤ 45,000	22 (73.3)	25 (83.3)	0.347
> 45,000	8 (26.7)	5 (16.7)	
Illness			
Yes	8 (26.7)	7 (23.3)	0.766
No	22 (73.3)	23 (76.7)	

Data are presented as n (%) or mean $\pm$ SD.

*: comparison between intervention group and control group.; t-test, Mann-Whitney U test, Chi-square test and Fisher's exact test at p=0.05.

and genetically based disabilities (e.g., epilepsy, down syndrome, angelman syndrome), c) had hearing loss, and d) had suffered a severe physical illness before the intervention. Parents were included in the study if they a) were the major caregivers who took responsibility for taking care of their child for at least one year, and b) could communicate in the Thai language. Parents were excluded from the study if they a) were not willing to be trained as part of the intervention procedures in the clinical setting for the full two-month duration of the intervention.

Sample size

There has been no previous speech-language pathology study on parent-implemented EMT using the TMCR model, and there has been no study in the Thai context that compares parent-implemented EMT using the TMCR model with general language stimulation using the Thai Speech and Language Test (TSLT). Therefore, there is no criterion for the sample size calculation in a reference interval study.

The sample size was calculated using the G*Power version 3.1.9.2 program by determining the significance level of $\alpha = 0.05$, and power of test 0.8 (80%). Further, the researcher used Cohen's guidelines for what constitutes a large ($d = 0.8$) effect size [22]. The required sample size per group was approximately 26 per group. This sample size was increased to approximately 29 per group to allow for an anticipated dropout rate of 10%. Therefore, the final targeted sample size was 60 children with LI (30 in the intervention group and 30 in the control group).

Randomization and masking

Block randomization with a ratio of 1:1 was applied to generate a randomization list (MS Excel), with a block size of two. The random sequence list was prepared by a statistician who was not involved in the recruitment or data collection of the research participants. If the participants met the inclusion criteria, they were then ran-

domly assigned to one of the two interventions: group 1 (parent-implemented EMT) or group 2 (general language stimulation), administered by a nurse who was not involved in the research. The randomized sequence was sequentially numbered and sealed by a nurse assistant who was not involved in the research in opaque envelopes for allocation concealment.

A single-blinded study design was utilized wherein the assessor, an experienced speech-language pathologist, was unaware of the group assignments. Due to the nature of the language intervention, the investigator, a certified speech-language pathologist with ten years of intervention experience with children with LI, associated with the study was not masked to the group assignment during the clinical trial.

Measures

Language skills

The primary outcome measure was children's standard score on the parental report form of the Thai Speech and Language Test Aged 0-4 Years Old [23]. The TSLT was developed based on the Thai culture and linguistic system and was standardized for the assessment of global language skills. TSLT can be applied with a cut-off point at 75 and 90 percentile for Thai children aged zero to four years. The reliability of parental testing and reporting was moderate (0.41-0.60). The inter-rater reliability among investigators was excellent (0.86-1.00) [24].

HRQoL

The secondary outcome measure was the standard score on the Pediatric Quality of Life Inventory™ (PedsQL™) parent proxy-report version: two to four years (very young child version). It was used to measure the HRQoL of children during the past 1 month. It consists of 23 items and 4 dimensions of physical functioning (8 items), emotional functioning (5 items), social functioning (5 items), and

school functioning (5 items). It is a 5-point Likert scale ranging from 0 (never a problem), 1 (almost never a problem), 2 (sometimes a problem), 3 (often a problem), and 4 (almost always a problem). All items were stated negatively. The items were reverse-scored and transformed to a 0-100 scale. The mean of the transformed item scores is referred to as a scale score, where higher scores indicate better HRQOL. The PedsQLTM version 4.0, a generic core scale, Thai version of the questionnaire, showed satisfactory reliability at 0.88 [25].

Intervention

General language stimulation

The control group received general language stimulation implemented by a speech-language pathologist for a two-

month duration. Each session lasted for 60 minutes and occurred once a week. While each child with LI attended the session, his/her parent or caregiver observed the intervention. The timetable for the control group program is summarized in Table 2.

Parent-implemented EMT using the TMCR model

The intervention group received parent-implemented EMT using the TMCR model implemented by the parent and a speech-language pathologist for a two-month duration. Each session lasted for 60 minutes and occurred once a week. Each child with LI was required to attend the session with his/her parent or a caregiver. The timetable for the intervention group program is summarized in Table 2.

Table 2. Timetable for the Intervention and Control Group Programs

Week	Intervention Group		Control Group	
	Child	Parent	Child	Parent
1	- The child is assessed for language development using the parental report form of the TSLT for children aged 0-4 years old.	- The parent assessed the child's HRQoL by using The PedsQLTM - They participated in a one-hour interactive workshop.	- The child is assessed for language development using the parental report form of the TSLT for children aged 0-4 years old.	- The parent assessed the child's HRQoL by using The PedsQLTM
	- The parent received a one-hour-long workshop (<i>teach</i>) by the SLP. - The parent received EMT (<i>matched turns</i>) using <i>teach</i> taught by the SLP for 15 minutes. - The child received EMT (<i>matched turns</i>) using <i>model</i> taught by the SLP for 15 minutes. - The parents practiced EMT (<i>matched turns</i>) for 15 minutes (<i>coach</i>) taught by the SLP. - The SLP provided feedback to the parent for 15 minutes (<i>review</i>).	- The SLP provided advice and suggestion and assigned homework to the parent. - The SLP made an appointment.	- The child received general language stimulation (<i>recast, parallel talks, and modeling and expanding</i>) taught by the SLP for 60 minutes. - The parent observed general language stimulation.	- The SLP provided advice and suggestion and assigned homework to the parent. - The SLP made an appointment.
2	- The parent received EMT (<i>matched turns</i>) using <i>teach</i> taught by the SLP for 15 minutes. - The child received EMT (<i>matched turns</i>) using <i>model</i> taught by the SLP for 15 minutes. - The parent practice EMT (<i>matched turns</i>) for 15 minutes (<i>coach</i>) taught by the SLP. - The SLP provided feedback to the parent for 15 minutes (<i>review</i>).	- The SLP provided advice and suggestion and assigned homework to the parent. - The SLP made an appointment.	- The child received general language stimulation (<i>recast, parallel talks, and modeling and expanding</i>) taught by the SLP for 60 minutes. - The parent observed general language stimulation.	- The SLP provided advice and suggestion and assigned homework to the parent. - The SLP made an appointment.
		- The SLP provided advice and suggestion and assigned homework to the parent. - The SLP made an appointment.		- The SLP provided advice and suggestion and assigned homework to the parent. - The SLP made an appointment.

Table 2. Continued

Week	Intervention Group		Control Group	
	Child	Parent	Child	Parent
3-4	- The parent received EMT (<i>modeling and expansions</i>) using <i>teach</i> taught by the SLP for 15 minutes. - The child received EMT (<i>modeling and expansions</i>) using <i>model</i> taught by the SLP for 15 minutes. - The parent practiced EMT (<i>modeling and expansions</i>) for 15 minutes (<i>coach</i>) taught by the SLP. - The SLP provided feedback to the parent for 15 minutes (<i>review</i>).	- The SLP provided advice and suggestion and assigned homework to the parent.	- The child received general language stimulation (<i>recast, parallel talks, and modeling and expanding</i>) taught by the SLP for 60 minutes. - The parent observed general language stimulation.	- The SLP provided advice and suggestion and assigned homework to the parent.
		- The SLP made an appointment.		- The SLP made an appointment.
5-6	- The parent received EMT (<i>time delays</i>) using <i>teach</i> taught by the SLP for 15 minutes. - The child received EMT (<i>time delays</i>) using <i>model</i> taught by the SLP for 15 minutes. - The parent practiced EMT (<i>time delays</i>) for 15 minutes (<i>coach</i>) taught by the SLP. - The SLP provided feedback to the parent for 15 minutes (<i>review</i>).	- The SLP provided advice and suggestion and assigned homework to the parent.	- The child received general language stimulation (<i>recast, parallel talks, and modeling and expanding</i>) taught by the SLP for 60 minutes. - The parent observed general language stimulation.	- The SLP provided advice and suggestion and assigned homework to the parent.
		- The SLP made an appointment.		- The SLP made an appointment.
7	- The parent received EMT (<i>milieu teaching prompts</i>) using <i>teach</i> taught by the SLP for 15 minutes. - The child received EMT (<i>milieu teaching prompts</i>) using <i>model</i> taught by the SLP for 15 minutes. - The parent practiced EMT (<i>milieu teaching prompts</i>) for 15 minutes (<i>coach</i>) taught by the SLP. - The SLP provided feedback to the parent for 15 minutes (<i>review</i>).	- The SLP provided advice and suggestion and assigned homework to the parents.	- The child received general language stimulation (<i>recast, parallel talks, and modeling and expanding</i>) by the SLP for 60 minutes. - The parent observed general language stimulation.	- The SLP provided advice and suggestion and assigned homework to the parent.
		- The SLP made an appointment.		- The SLP made an appointment.
8	- The parent received EMT (<i>milieu teaching prompts and all EMT</i>) using <i>teach</i> taught by the SLP for 15 minutes. - The child received EMT (<i>milieu teaching prompts and all EMT</i>) using <i>model</i> taught by the SLP for 15 minutes. - The parent practiced EMT (<i>milieu teaching prompts and all EMT</i>) for 15 minutes (<i>coach</i>) taught by the SLP. - The SLP provided feedback to the parent for 15 minutes (<i>review</i>).	- The parent assessed the child's HRQoL by using The PedsQL™	- The child received general language stimulation (<i>recast, parallel talks, and modeling and expanding</i>) taught by SLP for 60 minutes. - The parent observed general language stimulation.	- The parent assessed the child's HRQoL by using The PedsQL™
		- The child is assessed for language development by using the parental report form of the TSLT for children aged 0-4 years old.		- The child is assessed for language development by using the parental report form of the TSLT for children aged 0-4 years old.
		- The SLP provided advice and suggestion and assigned homework to the parent. - The SLP made an appointment		- The SLP provided advice and suggestion and assigned homework to the parent. - The SLP made an appointment.

Statistic methods

All statistical analyses were conducted using the

Statistical Package for the Social Sciences (SPSS) for Windows version 22.0. The data were analyzed using intention-to-treat (ITT) analysis. For descriptive statistics,

the percentage or mean $\pm$ SD was used to analyze the child and parent characteristics. T-test, Mann-Whitney U test, Chi-square test, and Fisher's exact test were used to compare data differences between the two intervention groups. A Mann-Whitney U test and independent samples t-test were used to compare scores between the two intervention groups at baseline (T_1) and at the end of the two-month intervention (T_2). Significance was set at $P<.05$.

Ethics

Ethical approval for the study was provided by the Institutional Review Board (IRB), Mahidol University (MU-CIRB 2019/226.0209), and Faculty of Medicine Vajira Hospital, Navamindradhiraj University (COA 134/2562). Informed consent was obtained from all participants.

RESULTS

ITT analysis

An ITT analysis was performed in this study. The details of participant recruitment, allocation, and flow throughout the study are summarized in the CONSORT diagram (Figure 1). Of the 65 eligible children, five were excluded prior to randomization. Four declined to participate in the full two-month duration of the intervention, and one did not meet the diagnostic inclusion criteria. Sixty participants were randomized into two arms of the trial. Participants were analyzed in a randomized study group. There were 29 and 28 participants in the intervention and control groups, respectively, remaining in the study for the duration of intervention, were analyzed. No ad-

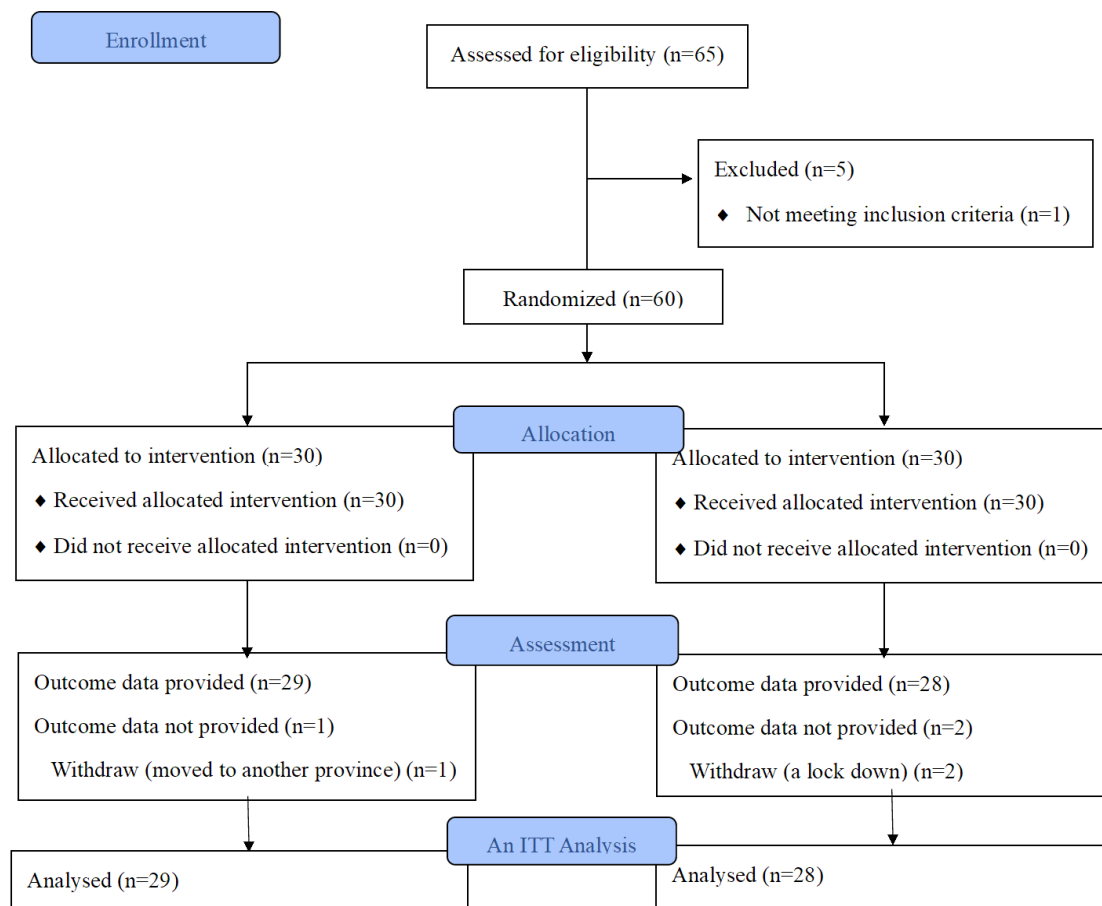


Figure 1. CONSORT diagram.

verse events were reported during intervention.

During the intervention, three families withdrew from the study: one in the intervention group withdrew because the child's mother could not take her child to the hospital as they moved to another province. Two families in the control group withdrew as there was a lockdown due to the coronavirus (COVID-19) pandemic in Thailand. Three missing data were from withdrawals that were not due to protocol violations, such as the switched group after randomization, noncompliance (when the patient does not follow the plan after randomization), or an unplanned excursion from the protocol. To maintain patient compliance with both interventions, the speech-language pathologist provided parent handouts and homework assignments that specified specific instructions and how to implement language strategies for both intervention and control groups.

Child and parent characteristics

Table 1 shows data on the child and parent characteristics of the intervention and control groups. There were no differences at baseline with regard to participant characteristics at the beginning of the study ($p=0.05$). Sixty children were randomly assigned to the intervention ($n = 30$) or control ($n = 30$) groups. There were 14 (48.3%) males and 16 (53.3%) females in the intervention group and 19 (63.3%) males and 11 (36.7%) females in the control group ($p=0.194$). Across the two groups, there were more males (33) than females (27), with a ratio of 1.22:1. This indicates the general trend in children with LI. The average age of the children in the intervention and control groups was 2.65 ± 0.56 and 2.70 ± 0.61 respectively ($p=0.729$). Among the 30 children in each group, two-thirds had SLI (66.7%), and one-third had GDD (33.3%) ($p=1.000$).

For family role, the responsibility for the child was mainly to the mother in both the intervention and control groups, with 73.3% and 63.3%, respectively ($p=0.727$).

The average age of the parents in the intervention and control groups was 34.40 ± 9.69 and 38.29 ± 12.95 respectively ($p=0.193$). More than half of the parents in both intervention and control groups had a high school degree or vocational certification, which accounted for 56.7% and 53.3%, respectively ($p=0.377$). Only 30.0% and 33.3% of the parents in both the intervention and control groups had full-time jobs. Housewives/husbands accounted for 66.7% and 63.0% of the parents in the intervention and control groups, respectively ($p=0.537$). For monthly income, 66.7% and 63.6% of the parents in the intervention and control groups, respectively, had no income ($p=0.864$). For family income, 73.3% and 83.3% of the families in the intervention and control groups, respectively, earned $\leq 45,000$ baths per month ($p=0.347$).

Child language skills

Language skills were estimated using the parental report form of the TSLT. Table 3 shows that after children received a two-month language intervention, it was found that there were no significant differences on language skills, including RLQ ($p = 0.09$, 95%CI: -1.76-21.41), ELQ ($p = 0.55$, 95%CI: -8.52-15.00), and CLQ ($p = 0.24$, 95%CI: -4.83-20.51) between the children in the intervention and control groups.

Child HRQOL outcomes

The HRQOL was estimated using the PedsQLTM parent proxy-report versions: two to four years (very young child version). Table 4 shows that after children received a two-month language intervention, there were no significant differences on HRQOL, including the physical health summary score ($p = 0.80$, 95%CI: -8.20-6.38), psychosocial health summary score ($p = 0.46$, 95%CI: -4.25-9.19), emotional functioning ($p = 0.98$, 95%CI: -6.80-6.63), social functioning ($p = 0.24$, 95%CI: -3.68-13.88), school functioning ($p = 0.64$, 95%CI: -21.23-13.46), and total

Table 3. Comparison of Mean Average Scores of Thai Speech and Language Test Between Children in the Intervention and Control Groups

Thai Speech and Language Test	Intervention (n = 29)		Control (n = 28)		Mean Difference	(95% CI)	p-value*
	Mean	SD	Mean	SD			
RLQ							
T ₁	18.55	20.51	13.59	19.45	4.96	(-5.66 - 15.58)	0.32
T ₂	32.35	22.63	22.52	20.95	9.83	(-1.76 - 21.41)	0.09
ELQ							
T ₁	7.50	11.13	6.92	10.31	0.57	(-5.13 - 6.27)	0.87
T ₂	18.59	23.19	15.35	21.02	3.24	(-8.52 - 15.00)	0.55
CLQ							
T ₁	20.48	20.70	17.44	20.36	3.04	(-7.86 - 13.94)	0.42
T ₂	36.67	25.05	28.83	22.56	7.84	(-4.83 - 20.51)	0.24

*Mann-Whitney U test

Note: 95%CI; 95% Confidence Interval

TSLT = Thai Speech and Language Test for children Aged 0-4 Years Old; RLQ= Receptive Language Quotient; ELQ= Expressive Language Quotient; CLQ = Combined Language Quotient

Table 4. Comparison of Mean Average Scores of PedsQL of Children Between the Intervention and Control Groups

PedsQL	Intervention (n = 29)		Control (n = 28)		Mean Difference	(95% CI)	p-value*
	Mean	SD	Mean	SD			
Physical Health Summary Score							
T ₁	73.60	22.36	77.28	18.76	-3.68	(-14.66 - 7.29)	0.50
T ₂	82.54	15.02	83.46	12.25	-0.91	(-8.20 - 6.38)	0.80
Psychosocial Health Summary Score							
T ₁	70.92	12.52	68.02	15.16	2.9	(-4.47 - 10.27)	0.43
T ₂	77.14	11.74	74.68	13.55	2.47	(-4.25 - 9.19)	0.46
Emotional functioning							
T ₁	65.52	14.04	67.68	13.64	-2.16	(-9.51 - 5.19)	0.55
T ₂	72.41	13.14	72.50	12.13	-0.09	(-6.80 - 6.63)	0.98
Social functioning							
T ₁	76.55	15.24	71.96	18.73	4.59	(-4.46 - 13.64)	0.31
T ₂	82.24	13.67	77.14	18.83	5.1	(-3.68 - 13.88)	0.24
School functioning							
T ₁	65.83	18.19	68.44	25.00	-2.61	(-23.51 - 18.29)	0.79
T ₂	75.00	21.36	78.89	17.78	-3.89	(-21.23 - 13.46)	0.64
Total Summary Score							
T ₁	72.08	14.72	72.03	14.21	0.05	(-7.63 - 7.74)	0.98
T ₂	79.67	10.49	78.73	11.69	0.94	(-4.96 - 6.83)	0.75

*Independent samples t-test

summary score (p = 0.75, 95%CI: -4.96-6.69), between the children in the intervention and control groups.

DISCUSSION

The first purpose of the study was to examine the ef-

fects of parent-implemented EMT on the language skills of children with LI using the TMCR model versus general language stimulation. Results showed that there were no significant differences on language skills, including RLQ, ELQ, and CLQ, between the two groups of children after receiving a two-month language intervention (Table 3). Therefore, our results did not fully support our first hypothesis that Thai-speaking children with LI who receive parent-implemented EMT using the TMCR model have better language outcomes than those who receive general language stimulation.

There may be two explanations for these findings. First, EMT language support strategies tend to be similar to general language stimulation strategies. The first strategy in EMT is matched turns [15,16], which is similar to recast and parallel talk [9] in general language stimulation. In addition, the two interventions have similar language strategies, including modeling and expansion [9,15,16]. Similar to Friend and Corker [21], the authors found that there were no significant differences on language skills between children in the intervention group who received EMT and children in the control group who received standard community interventions at 6 and 12 months. The authors describe standard community interventions as an informal speech and language therapy, including parent-child interaction or verve-child interaction therapy, which appears very similar to the strategies used in EMT. In the current study, it could be that children who received general language stimulation underwent similar language strategies as those who received parent-implemented EMT using the TMCR model. Second, the timing and delivery of parent-implemented EMT using the TMCR model and general language stimulation provided during the session were equal. The two groups of children received a 60-minute session for two months. Similar to Friend and Corker [21], the authors found that children in the intervention and control groups received the same duration of a 6-month intervention. In the current study, it could be that the two groups of children

received the same timing and delivery of intervention. The results of this study clearly show that parent-implemented intervention is not significantly better than a therapist-centered intervention. Both language interventions are equally viable forms of intervention.

Interestingly, compared with the control group, children in the intervention group had higher language scores at two months (Table 3). It might be that training parents to use effective, evidence-based language interventions in daily activities and natural settings, on the other hand, has the potential to increase the number of hours per week that children receive intervention. The results were supported by empirical studies that demonstrated that parents' use of EMT strategies can enhance their children's language development during play activities at home and/or in the clinic. The children gained language outcomes [15,16,18,19]. Wanicharoen et al. [26] reported that, initially, most parents understood that health professionals or speech-language pathologists played the role of promoting child language development while parents played the role of bringing children to receive services. After receiving a two-month parent training program, parents will become more involved in teaching and implementing their use of language strategies in both clinical and home settings. If parents understand and accept the child's limitations and have a positive attitude towards their children's language development and intervention, they can make the practice effective and successful. Given its importance, parent-implemented EMT using the TMCR model changes in parent behavior and child language skills. Therefore, this parent training program may be recognized as one of the language interventions for preschool children with LI, including SLI and GDD, and their parents in Thailand.

The second purpose of this study was to examine the effects of parent-implemented EMT using the TMCR model versus general language stimulation on the HRQOL of children with LI. The results showed that there were no significant differences in HRQOL, including physical

health summary score, psychosocial health summary score, emotional functioning, social functioning, school functioning, and total summary score, between the two groups of children (Table 4). Therefore, our results did not fully support our second hypothesis that Thai-speaking children with LI who receive parent-implemented EMT using the TMCR model have better HRQOL outcomes than those who receive general language stimulation.

One possible explanation is that the emphasis of the parent-implemented EMT using the TMCR model and general language stimulation are similar. These two language interventions, with their emphasis on children's language development and communication skills, appear to be complementary [9,14]. As the two groups of children's language development improves, it may have a similar effect on their HRQOL. In contrast to Hsieh et al. [27] and Hsieh et al. [28], children with developmental delays who received a 6-week small group-based family centered workshop showed significant improvement in physical functioning. This intervention emphasizes children's communication, cognition, physical function, and behavior. This was an expected finding. For example, developmental delays such as cerebral palsy is the most serious physical condition [29] and down syndrome normally has delays in motor skills [30]. Therefore, it is not surprising that physical functioning showed significant changes after receiving the intervention. Therefore, we considered a parent-implemented intervention and a therapist-centered intervention to both benefit children's language skills and their QOL.

Interestingly, it was found that the children in the intervention and control groups had a physical health summary score with the highest mean score (Table 4). One possible explanation is that parents may not perceive physical problems as a cause for concern because they consider their children's language impairment as the primary impairment [2,31]. Parents who are unconcerned about their children's physical problems are less likely to seek out programs that can assist them in developing

physically, thus missing out on opportunities for intervention [2]. It should be noted that parents' individual perspectives on their children's HRQoL influence and lead clinical decision-making and healthcare service utilization.

On the other hand, the lowest mean score was for emotion functioning in both groups of children (Table 4). One possible explanation is that children with LI had difficulty understanding people or expressing what they wanted or needed. The failure of effective communication caused emotional difficulties [32-35] and behavioral difficulties [31]. Given the fact that these children may present with complex problems, this current study recommends the importance of speech therapy services in dealing with children's challenges and helps to prevent the limitations and improve the QOL of children with LI [6-7,31].

LIMITATION

This study has some limitations. First, there was limited diversity in the population of children. In the current study, 60 children were diagnosed with SLI or GDD. The positive results can be generalized to similar samples. Therefore, studies must be conducted on other disabilities using the parent-implemented EMT using the TMCR model before broad conclusions can be made. Second, there was a lack of follow-up data to assess whether children maintained their language skills. Therefore, future studies could explore intensive and long-term language interventions.

CONCLUSIONS

This study is the first to examine the effects of parent-implemented EMT using the TMCR model and gen-

eral language stimulation on language skills and HRQOL in children with LI in Thailand. The results of this study clearly show that parent-implemented EMT using the TMCR model is not significantly better than general language stimulation. The two groups of children gained in language skills and in HRQOL. Both language interventions are equally viable forms of intervention and effect children's language skills and HRQOL similarly. However, children in the intervention group had higher language scores at two months; therefore, parent-implemented intervention may be regarded as one of the effective language interventions for children with LI, including SLI and GDD, and their parents in the Thai context.

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CONFLICTS OF INTEREST

The authors have no conflicts of interests to disclose.

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