

Original Article

Prescribing Books for Preschoolers under Comprehensive Child Development Service in Hong Kong East: A Pilot Study

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Abstract

Aim: To determine if book prescription by paediatrician at community-based clinics can improve literacy orientation and home literacy environment in high-risk families. **Patient & Methods:** 70 at risk children under Comprehensive Child Development Service aged from 6 to 30 months received book prescription from April to December 2017. Questionnaires on reading aloud were completed by parents just before the intervention and then 6 months later. **Results:** Before book prescription, 25.7% of parents read book with their child and 17.1% chose reading book with their child as top three preferred activities. After the intervention, the corresponding figures significantly increased to 54.3% and 51.4% (p-values <0.001) respectively. Parents read more frequently with their child every week (p-values <0.001) and had more books at home after intervention (p-values <0.001). **Conclusions:** Book prescription by paediatrician at community-based clinics can be an effective strategy in promoting positive parenting and early literacy development for high-risk children locally.

Key words

Comprehensive child development service; Preschooler; Reading aloud

Introduction

Research showed that reading with young children stimulates optimal patterns of brain development and strengthen parent-child bonding, which in turn builds life-long language, literacy, social and emotional skills.¹ This was particularly important for young children under toxic stress.² Paediatric service provider was recommended to promote early literacy development beginning in infancy and provide anticipatory guidance through giving developmentally appropriate books at clinic to these high risk children.^{1,2}

Recommendation by American Academy of Paediatrics (AAP) was based on the widely studied evidence-based literacy program, Reach Out & Read (ROR) in the United States (US). In the ROR program, paediatricians provided free developmentally appropriate picture books and anticipatory guidance about reading aloud as part of routine health supervision for children 6 months to 6 years old while clinics provided literacy rich waiting areas. Research showed that ROR intervention was associated with more positive parenting attitudes in population at risk, better parent-child interaction and language development in early childhood resulted from frequent reading aloud by parents.³

Comprehensive Child Development Service (CCDS) in Hong Kong aimed at early identification of at-risk young children (maternal mental illness, perinatal mood disorder, substance abuse and teenage pregnancy) and timely provision of clinical and social support to them and their families.⁴ These children with maternal risk factors growing up in high risk families were potentially or already under toxic stress which had negative impact on their development.

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The current study was developed based on the concept of toxic stress referred in the AAP recommendation and ROR program. To the best of our knowledge, there have been no previous studies on ROR approach program locally. The aim of this study was to examine the effectiveness of book prescription by paediatrician at local community clinics, as a clinic-based intervention to promote positive parenting behaviour and emergent literacy for high-risk preschoolers under CCDS. The null hypothesis is that book prescription by paediatrician has no effect on literacy orientation, frequency of reading aloud and number of books at home.

Methods

Participants

The study period was from April 2017 to December 2017. Parents of children aged 6 to 30 months born from mothers suffering from active mental or mood disorder, substance misuse or teenage pregnancy under CCDS attending paediatric on-site clinic at Maternal & Child Health Centres (MCHC) in Hong Kong East, namely Chai Wan, Sai Wan Ho and North Point MCHC in April and May 2017 were invited to participate in the study. They were excluded if their children were acutely ill during clinical visits or had significant development problem. Written informed consent was obtained from eligible participating parents.

Procedure

After the participants completed the pre-intervention questionnaire, the paediatrician prescribed a book named "HUG" to them. Procedures of book prescription included: 1) read the book with the child and demonstrate techniques of reading aloud to parents 2) discuss on benefits of reading aloud like mutual enjoyment, social closeness and facilitating language and literacy development 3) provide anticipatory guidance to parents on parenting and development, particularly expected age appropriate behaviour during book sharing 4) encourage parents to read aloud at home and distribute the book with reading tips at the last page for them to take home. This book was age appropriate and suitable to participants as confirmed by local paediatrician and clinical psychologist to be. This colourful board book contains abundant familial animals expressing love by hugging but only very few words. Follow

up clinic visits six months after book prescription was arranged and the same questionnaire was completed by the participants.

Assessment Tool

This prospective intervention study, with a before-and-after design used 2 sets of questionnaire on reading aloud at interval of six months. The questionnaire was designed with reference to assessment tools used in previous studies on literacy orientation, child-centered literacy orientation and home literacy environment.⁵⁻⁷ It contained 4 questions in Chinese (with English translation):

- Q1) Did you read aloud with your child in the past 24 hours?
- Q2) How many children books do you have at home?
- Q3) How many times do you read with your child per week in average?
- Q4) What are your child's top three favourite activities (excluding eating and sleeping)?

Literacy orientation was scored positive if parents' answer to Q1 was yes or "reading" was among the child's three favourite activities for Q4.

Statistical Analysis

The number of subjects to be recruited was estimated based on the number of patients attending paediatric on-site clinics. The demographic, clinical characteristics of participants and questionnaire responses were described. The change in literacy orientation, number of children books at home and frequency of parent reading aloud were calculated according to the questionnaire responses done on the day of book prescription and six months later. Mann-Whitney U test and McNemar's test were used to compare the change in four questions and literacy orientation for all participants before and after the intervention. Generalised Estimating Equation was used to test whether the effect of the intervention is different among subgroups (teenage pregnancy, substance abuse and mood / mental disorder). Logistic regression analysis was used to measure the possible contributing factors (baby's age & gender, maternal age, marital & employment status, main caretaker and financial assistance) to the intervention effect. Statistical analysis was conducted using SPSS software, with $P < 0.05$ considered as statistically significant in this study.

STROBE statement was used as the reporting guideline.

Results

Parents of 103 children were recruited in the study at start in April and May 2017 with no exclusion or refusal but 33 failed to turn up at the follow up visit 6 months later. Failure to turn up at the scheduled or rescheduled clinical visits within 4 weeks was counted as loss of follow up in the study. Finally, parents of 70 recruited children (38 male, 32 female) completed the study. The age at enrolment of study ranged from 6.07 to 25.8 months with a mean age of 11.66 months old. Majority 134 (95.7%) of parents of participants were Chinese in origin. The participants were divided into three subgroups according to maternal risk factors (3 teenage pregnancy, 6 substance abuses and 65 active mood or mental disorder). Three children were victims of neglect. Demographic data and clinical characteristics of participants were shown in Table 1.

Changes in Literacy Orientation

Responses to the questionnaire before and after intervention were summarised in Table 2.

Before the intervention, only 18 (25.7%) of 70 parents read children book with the child and 12 (17.1%) chose reading book with the child as the top three preferred activities. After the intervention, the corresponding figures significantly increased to 38 (54.3%) and 36 (51.4%) respectively (p-value <0.001). Positive literacy orientation, as reflected by positive response to either of the above 2 parameters, increased by 2.35 times in 6 months from 20 (28.6%) to 47 (67.1%) after intervention (p-value <0.001).

Changes in Home Literacy Environment

Before intervention, 49 of 70 participants (70%) had one or more children books at home. Though many participants had books at home, more than half (44, 62.9%) "never" read with their children. After intervention, nearly all (94.3%) had one or more children books at home (P<0.001) and majority of parents (60, 85.7%) read with their children at least once per week (P<0.001). The proportion of parental reading with children 1-4 times per week rose from 20% to 35.7% and reading 5 times per week rose from 17.1% to 50% (P<0.001). Positive changes in home literacy environment were evident from the increase in children books at home and frequency of parents reading with child.

Subgroups Analysis

After subgroup analysis, significant factors for outcome

were shown in Table 3. Maternal age was a significant independent factor associated with improvement of literacy orientation (OR=1.139; 95%CI 1.036-1.253, p-value <0.05) and mother at work was negatively associated with

Table 1 Demographic and clinical characteristics of participants (n=70)

Characteristics	Number (%)
Gender of child	
Male / Female	38 (54.3) / 32 (45.7)
Age of child at entry of study	
6-12 months	35 (50)
12-18 months	18 (25.7)
18-24 months	13 (18.6)
24-30 months	4 (5.7)
Parents' country of origin	
China	134 (95.7)
Thailand	1 (0.7)
Belgium	1 (0.7)
Pakistan	2 (1.4)
Indonesia	1 (0.7)
United Kingdom	1 (0.7)
Maternal problems (Subgroups)	
Teenage pregnancy	3 (4.3)
Substance abuse	6 (8.6)
Mood or mental disorder	65 (92.9)
Maternal age entry of study	19-44
Maternal marital status	
Married	56 (80%)
Single	14 (20%)
Maternal employment status	
Housewife	41 (58.6%)
At work	29 (41.4%)
Maternal education level	(N=45, 25 missing data)
Primary	1 (2.2%)
Lower secondary	8 (17.8%)
Upper secondary	24 (53.3%)
Post secondary	12 (26.7%)
Financial assistance	
On Comprehensive Social Security Assistance (CSSA)	7 (10%)
Not on CSSA	63 (90%)
Main carer	
Parents	44 (62.9%)
Grandparents	13 (18.6%)
Others	13 (18.6%)

the improvement (OR=0.228; 95%CI 0.054-0.96, p-value <0.05). Baby's age and gender, maternal marital status, main caretaker and financial assistance were not associated with improvement in literacy orientation. Mother at work was a significant independent factor that negatively associated with improvement in number of books at home (OR=0.019; 95%CI 0.048-0.764, p-value <0.05). Age of baby was a significant independent factor associated with improvement in frequency of reading with children (OR=1.115; 95%CI 1.014-1.227, p-value <0.05). No association with these outcomes was found in other potential contributing factors.

With regard to maternal risk subgroups, namely, teenage pregnancy, substance abuse and active mood / mental disorder, there was no significant subgroup difference in the effects of intervention.

Discussion

To the best of our knowledge, this was the first local

study on paediatric on-site clinic-based intervention using ROR approach to promote positive parenting behaviour particularly mother-baby interaction and emergent literacy. Studies on ROR approach intervention mainly focus on those families with economic and social risks in other countries like the US and India.^{5,8,9} The current study focused on mainly Chinese children with maternal high risk factors - mental or perinatal mood problems, substance abuse and teenage pregnancy which were known to be adverse childhood experiences causing toxic stress on their brain development.² In summary, our local findings were in agreement with the observation of other published reports on literacy orientation, home literacy environment and clinic-based intervention on reading aloud in the US,¹⁰⁻¹² India⁹ and Singapore.⁷

Literacy orientation describes children's level of interest or engagement in literacy events. It is a critical factor in children's language and emergent literacy development.⁷ This measure was believed to be subject to least reporting bias.⁶ Needleman et al⁶ evaluated a pilot program in which paediatrician distributed books to children with anticipatory

Table 2 Changes in responses to questionnaire before and after intervention (n=70)

	Response	Pre-intervention Number (%)	Post-intervention Number (%)	p-value
Reading with child in the past 24 hours	Yes	18 (25.7)	38 (54.3)	<0.001
	No	52 (74.3)	32 (45.7)	
Number of children books at home	0	21 (30.0)	4 (5.7)	<0.001
	1-4	26 (37.1)	18 (25.7)	
	≥5	23 (32.9)	48 (68.6)	
Number of days per week parent read with child	0	44 (62.9)	10 (14.3)	<0.001
	1-4	14 (20.0)	25 (35.7)	
	≥5	12 (17.1)	35 (50.0)	
Reading as child's top three favourite activity	Yes	12 (17.1)	36 (51.4)	<0.001

Table 3 Significant factors for each outcome in the multiple logistic regression analysis

Outcome	Independent factor	Odds ratio	95% C.I.	p-value
No. of books at home	Maternal working status	0.191	0.048 - 0.764	0.019
Reading frequency	Age of the child	1.115	1.014 - 1.227	0.025
Literacy	Age of mother	1.139	1.036 - 1.253	0.007
Orientation	Maternal working status	0.228	0.054 - 0.960	0.044

All results were adjusted for gender, age of child, main carer, age of mother, marital status, financial assistance, and maternal working status

guidance at clinic visit and found that 53% subject receiving a book had a positive literacy orientation after book distribution at intervention group and result was more significant for low-income group. A similar study by High et al⁵ found that families with intervention had significantly high (69%) child-centered literacy orientation. The positive literacy orientation post intervention (67.1%) in the current study was comparable to these findings.

Home literacy environment can be defined either as the "number" of picture books at home or frequency of parent-preschooler shared reading. A literacy-home environment is important because it is another key factor in children's language and literacy acquisition other than literacy orientation.⁷ A Singapore descriptive study on literacy environment of 12-month-old babies found that most families (92.6%) have children books at home; with 62%, 17.5% and 13% owning less than 10, 10-30, more than 30 books respectively. In the current study, only 60% of families have children books at home and the proportion increased significantly to 94.3% after intervention.

In a randomised controlled study for literacy promotion by paediatrician for Hispanic families in the US,¹² 66% of intervention group parents reported reading to their child at least 3 days per week. A similar Taiwan study for Chinese babies found 46% after intervention.¹³ Observation of present study in frequency of reading was high with 50% reading to their children 5 days per week after book prescription. Only a few small-scale studies on reading aloud by educators were published locally. The survey of Department of Health carried out in Maternity and Child Health Centres in Hong Kong for normal children below 5 years of age showed that 51% of parents always accompany children to read.¹⁴ Our study in high-risk families for preschoolers showed that frequency of reading aloud was only 25.7% before intervention, reflecting the need for more support in this high-risk group. After intervention the frequency of reading aloud increased to 54.3% and it was comparable with normal children.

We adopted the ROR-approach intervention. The basic ROR model is consisted of 3 components: literacy-rich waiting rooms, a book to take home at each health supervision visit and anticipatory guidance which is the heart of ROR mission.³ Our intervention program did not include the first component as provision of literary-rich waiting rooms was not feasible, however, our "modified" ROR program as was still effective, with results similar to literacy promoting program which included only the latter 2 components in another study.¹²

These findings support the intervention for promoting literacy at clinic setting by paediatrician. A recent meta-analysis¹⁵ reviews that paediatric provider delivered intervention did demonstrate positive impact on parenting behaviour towards literacy promoting activities. This success may be related to the respect to the profession from the public. In ROR model, book is given by the "primary care provider"¹³ and a previous study found positive result with involvement of nurse practitioners.⁵ Health care professionals other than paediatrician under CCDS were encouraged to join. The principle behind the effective intervention is to change the parental reading belief and it is an important and significant predictor factor of shared reading. Book "distribution" alone is not effective enough in changing parental attitude and behaviour. Effective program should include both the design of encouraging parental belief and modelling the choice of developmentally appropriate books and shared techniques for reading.¹⁶ In the present study, we "prescribe" rather than just distribute the book at the clinic.

Paediatric on-site clinic in Maternal & Child Health Centre was a non-stigmatising place where parents of at-risk children are more willing to attend and receive guidance from professionals. The practice of book prescription at Hong Kong East may be also beneficial to these high-risk families under CCDS in paediatric on-site clinics at other regions since recruitment criteria is standardised and clinic settings are similar in Hong Kong.

The predictors of home literacy environment and reading frequency namely, mother's education level and parents' national origin were found in previous studies done US and Singapore.^{7,8} Due to high missing data on maternal education level and very low percentage of non-Chinese participants, subgroup analysis did not include these two factors. The present study showing new finding of greater improvement of literacy orientation at higher maternal age may reflect the better receptiveness in older age. Besides, mother at work showing less improvement in both literacy orientation and number of children books at home may reflect their lack of time in taking care of their babies. These results pointed to the need of more support to younger parents particularly the teenage mothers and mothers at work in book prescription.

We start to prescribe books as early as six months old. Benefits of starting reading from infancy include early learning to associate books with enjoyment, promoting joint attention with adults and early reading habit development. Some studies have found the positive effect

of reading during infancy on promoting parent-child interaction at paediatric primary care clinic.^{15,17} Recommendation by AAP was to promote early literacy development by paediatric providers from infancy and continuing at least until the age of kindergarten entry.¹ The current study found that with increase in baby's age, the improvement of reading aloud frequency became more significant. This finding supported book prescription to be continued after infancy to obtain a sustainable and better outcome for older children.

In Hong Kong, there are only a few small-scaled local studies on shared reading or reading aloud with preschoolers. Unlike other western countries that hold national reading program for raising parents' awareness in reading aloud early and equipping them with skills and resources, there is no centralised literacy program in Hong Kong. Paediatrician can take a proactive role in promoting early literacy, starting from book prescription and develop further on structured reading program with collaboration of early childhood educators and social workers.¹⁸

The major limitation of this study was the lack of a control group and no reference for comparing the effect of book prescription with no intervention. Nonetheless, the study findings were comparable with post-intervention group of similar studies in other countries. High-risk families were known to have poor compliance to clinical visits and in the present study the default rate was 32%. These default subjects may represent even higher risk group with more adverse factors and future study on evaluating them was valuable. Relative small sample size can result in error on subgroup analysis of subjects with small numbers. Besides, results based on self-reporting only assessed perception but not behaviour and can be subjected to biases. Home visitation with direct counting of books at home may get more objective and valid data. Other objective measures to assess the improvement of actual literacy rate and the developmental milestone on the long-term effect of language development, reading abilities and school achievement should be used in future studies. Besides, a longer intervention and study period is needed for more books to be prescribed and better reflection on its long-term effect.

This preliminary study suggests that this simple, inexpensive clinic-based intervention by paediatrician at primary care setting can lead to positive changes in attitude of parents of at risk children and their home literacy environment. Paediatricians are recommended to take advantage of clinic visits as an opportunity to counsel

high-risk parents on reading aloud and develop literacy promoting program so as to reduce the effect of toxic stress on these high-risk children.

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Ethical Approval

The study was approved by the Ethics Committee of Hospital Authority Hong Kong East Cluster (HKECREC-2017-053). Informed consent was obtained from parents.

Declaration

The author has no conflicts of interest to disclose. The author had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

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