Psychosocial Effects of Parent-Child Book Reading Interventions: A Meta-analysis

Qian-Wen Xie, MSW,a Celia H.Y. Chan, PhD,a Qingying Ji, MD, MSW,a Cecilia L.W. Chan, PhDa

CONTEXT: Parent-child book reading (PCBR) is effective at improving young children's language, literacy, brain, and cognitive development. The psychosocial effects of PCBR interventions are unclear.

OBJECTIVE: To systematically review and synthesize the effects of PCBR interventions on psychosocial functioning of children and parents.


STUDY SELECTION: Randomized controlled trials.

DATA EXTRACTION: By using a standardized coding scheme, data were extracted regarding sample, intervention, and study characteristics.

RESULTS: We included 19 interventions (3264 families). PCBR interventions improved the psychosocial functioning of children and parents compared with controls (standardized mean difference: 0.185; 95% confidence interval: 0.077 to 0.293). The assumption of homogeneity was rejected ($Q = 40.010; P < .01$). Two moderator variables contributed to between-group variance: method of data collection (observation less than interview; $Q_b = 7.497; P < .01$) and rater (reported by others less than self-reported; $Q_b = 21.368; P < .01$). There was no significant difference between effects of PCBR interventions on psychosocial outcomes of parents or children ($Q_b = 0.376; P = .540$).

LIMITATIONS: The ratio of moderating variables to the included studies limited interpretation of the findings.

CONCLUSIONS: PCBR interventions are positively and significantly beneficial to the psychosocial functioning of both children and parents.
There is extensive literature in which researchers support the positive contributions of parent-child book reading (PCBR) experiences to early child development, especially language and literacy development.\textsuperscript{1,2} PCBR during early childhood is also a strong predictor of children’s brain development\textsuperscript{3} and later academic achievement.\textsuperscript{4} Given the benefits of PCBR, a Policy Statement from the American Academy of Pediatrics recommends that it is a responsibility of pediatric health care providers to encourage parents to read with their children as early as possible.\textsuperscript{5}

A large number of PCBR intervention programs have been implemented worldwide, such as the Reach Out and Read program in the United States and the Home Interaction Program for Parents and Youngsters in Australia. PCBR interventions have been suggested as an important tool in closing the achievement gap between families of high and middle socioeconomic status (SES) and families of lower SES.\textsuperscript{6} However, the lack of systematic evaluation of the effects of PCBR interventions has been a major criticism.\textsuperscript{7}

In the past, research on the effects of PCBR has been limited to the field of early childhood education. Recently, an increasing number of scholars have suggested looking at the benefits of PCBR in a broader way, rather than exclusively focusing on literacy or language development of children.\textsuperscript{8,9} To date, there have been few studies in which researchers have studied the psychosocial effects of PCBR on children, and their findings are inconsistent.\textsuperscript{10–14} Moreover, the role of parents as beneficiaries in PCBR interactions has been often ignored, despite some evidence that PCBR interventions could not only improve parenting competence\textsuperscript{15,16} and parent self-esteem\textsuperscript{17} but also reduce parent stress and depression.\textsuperscript{18,19}

Although PCBR has been recognized as an interactive activity between parents and children, limited research has been focused on its impact on the quality of parent-child relationships. In the 1990s, Bus et al.\textsuperscript{20} demonstrated an association between PCBR activities and child-parent attachment relationships, whereas more recent studies have revealed mixed results.\textsuperscript{13,21}

Researchers have explored the predictors that might moderate the effectiveness of PCBR interventions in improving the language or literacy development of children. There are inconsistent findings from this research, with some evidence for children’s age,\textsuperscript{22,23} sex,\textsuperscript{24} race and/or ethnicity,\textsuperscript{1} and at-risk status\textsuperscript{25} and parents’ sex,\textsuperscript{26} educational background,\textsuperscript{27} and SES as predictors\textsuperscript{28}; however, authors of other studies have suggested that PCBR was equally effective despite children’s age, ethnicity, at-risk status,\textsuperscript{29} and family’s SES.\textsuperscript{16} There is also the school of thought that different characteristics of PCBR interventions might produce different effects.\textsuperscript{2} For example, researchers suggest that children could benefit more from interventions by using dialogic reading (DR) techniques that emphasize high levels of adult-child interaction than traditional book reading.\textsuperscript{25,30}

PCBR interventions emphasize parent-child interactions and family empowerment rather than directly targeting developmental problems. It is therefore important to understand how well PCBR interventions work in enhancing psychosocial outcomes related to parent-child interactions. Psychosocial functioning encompasses various aspects of psychological, psychiatric, and social competence and well-being, and it refers to the ability of self-caring or working, a positive evaluation of self and life, and a positive well-being received from meaningful relationships or activities.\textsuperscript{31,32} Psychosocial functioning has usually been measured by symptom severity\textsuperscript{31} (eg, depression,\textsuperscript{33} stress symptoms,\textsuperscript{34} behavioral problems,\textsuperscript{35} etc), personal competence or skills\textsuperscript{31} (eg, personal performance, social-emotional adjustment,\textsuperscript{36} parental practices\textsuperscript{37}), and sociocultural expectancies\textsuperscript{31} (eg, quality of life\textsuperscript{16} and parent-child relationships\textsuperscript{38}).

There is no synthesis of the available research on the impact of PCBR interventions on the psychosocial functioning of children and parents. Two research questions underpinned the meta-analysis reported in this article: (1) do PCBR interventions positively affect the psychosocial functioning of both children and parents, and (2) to what extent are these intervention effects moderated by sample characteristics, study characteristics, and intervention characteristics?

**METHODS**

The meta-analysis was reported on the basis of the PRISMA reporting standard.\textsuperscript{39}

**Eligibility Criteria**

Studies were included in this meta-analysis if the following were included:

1. a PCBR intervention group that received structured training, supportive materials, or other reading-related services for encouraging parents to read books with their children was compared with a control group that did not;
2. a randomized controlled trial (RCT) design was used;
3. outcome variables were contained that were measures of psychosocial functioning of children or parents;
4. sufficient empirical information to calculate effect sizes was provided; and
5. the study was reported in the English language and published in peer-reviewed journals.
**Information Sources and Search Strategy**

Studies were identified by a comprehensive literature search through 10 electronic databases, including ERIC, PsycINFO, Medline, Embase, PubMed, Applied Social Sciences Index and Abstracts, Social Services Abstracts, Sociological Abstracts, Family and Society Studies Worldwide, and Social Work Abstracts. Search dates were from the date of inception to June 2017. Search terms comprised the following synonyms: (reading or literacy) and (parent-child or family or home) and (random* or experiment* or RCT). In addition, the reference lists of previous reviews1,2,5,29,40–43 were hand searched for relevant intervention studies.

**Study Selection and Quality Assessment**

All records were exported to EndNote software for the management of studies and elimination of duplicates.44 Titles, abstracts, and full texts of the remaining studies were scanned, according to the selection criteria. To assess the quality of each study, 2 investigators independently calculated the methodology quality score on the basis of the Consolidated Standards of Reporting Trials (CONSORT) 2010 checklist.45 The checklist contained 10 items regarding the research method, such as trial design, participants, interventions, outcomes, sample size, randomization, blinding, and statistic methods. The score was coded as 1 for 1 item. A study received the highest score (10) when it satisfied all criteria.

**Data Collection**

By using a standardized coding scheme (Table 1), data items were extracted regarding sample characteristics, intervention characteristics, or study characteristics. Because multiple outcome measures were reported in this literature review, 2 study characteristics (ie, rater and method of data collection) were coded at the outcome domain level instead of the study level. We were interested in the effects of independent PCBR interventions. When researchers in a study compared 2 independent PCBR intervention groups to 1 control group, we treated the 2 independent PCBR interventions as 2 separate studies. Also, we equally divided the sample of the control group of the original study into 2 groups to prevent participants from being counted more than once. Similar procedures were used in previous meta-analysis studies.25,46

Two raters independently coded a random sample of 20% of the included studies to estimate the interrater reliability of the study codes. We calculated Cohen’s κ by using SPSS (IBM SPSS Statistics, IBM Corporation, Armonk, NY), in which a high level of agreement between the raters was revealed (unweighted κ = 0.88). After all coding inconsistencies between coders were resolved by discussion, 1 rater coded the remaining 80% of the studies.

**Synthesis of Results**

Calculations for the meta-analysis were performed by using the Comprehensive Meta-Analysis (CMA) software.47 For each intervention, we computed an effect size as a standardized mean difference between the mean of a PCBR

---

**TABLE 1 Coding Scheme**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Scale</th>
<th>Interrater Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Sample size</td>
<td>No. participants in intervention and control groups in the posttest</td>
<td>κ = 0.692</td>
</tr>
<tr>
<td>(B) Method score</td>
<td>Scores calculated according to the CONSORT 2010 checklist</td>
<td>κ = 0.333</td>
</tr>
<tr>
<td>(C) Child’s age</td>
<td>Mean age of children at onset of study, mo</td>
<td>κ = 0.687</td>
</tr>
<tr>
<td>(D) Child’s sex</td>
<td>Percentage of girls</td>
<td>κ = 0.692</td>
</tr>
<tr>
<td>(E) Child’s race and/or ethnicity</td>
<td>Percentage of ethnic minorities: 1 = predominantly white; 2 = predominantly minority</td>
<td>a</td>
</tr>
<tr>
<td>(F) Child’s at-risk status</td>
<td>0 = not at risk; 1 = at risk (had low incomes, had less-educated mothers, had behavior problems, had language delay, or lived in a disadvantaged community)</td>
<td>a</td>
</tr>
<tr>
<td>(G) Participated parents</td>
<td>1 = mothers only; 2 = mix (% of mothers)</td>
<td>a</td>
</tr>
<tr>
<td>(H) Parental education</td>
<td>1 = low; 2 = mix</td>
<td>a</td>
</tr>
<tr>
<td>(I) SES</td>
<td>1 = low; 2 = mix</td>
<td>a</td>
</tr>
<tr>
<td>(J) Country</td>
<td>1 = United States; 2 = other than United States</td>
<td>a</td>
</tr>
<tr>
<td>(K) Delivery context</td>
<td>1 = home; 2 = school; 3 = primary care center or hospital; 4 = others (eg, library, Head Start center, or laboratory)</td>
<td>a</td>
</tr>
<tr>
<td>(L) DR</td>
<td>0 = no; 1 = yes</td>
<td>a</td>
</tr>
<tr>
<td>(M) Psychosocial component</td>
<td>0 = no; 1 = yes</td>
<td>a</td>
</tr>
<tr>
<td>(N) Duration, mo</td>
<td>Period from pretest to posttest: numerical (1 school y = 10 mo)</td>
<td>κ = 0.692</td>
</tr>
<tr>
<td>(O) Structured training</td>
<td>0 = no; 1 = yes</td>
<td>a</td>
</tr>
<tr>
<td>(P) Dosage of training</td>
<td>Numerical</td>
<td>a</td>
</tr>
<tr>
<td>(Q) Delivery method</td>
<td>1 = individual; 2 = group</td>
<td>κ = 0.500</td>
</tr>
<tr>
<td>(R) Home visits</td>
<td>0 = no; 1 = yes</td>
<td>a</td>
</tr>
<tr>
<td>(S) Staff quality</td>
<td>1 = professionals (eg, people with a degree in early education or speech pathology); 2 = semiprofessionals (eg, social workers, nurses, physicals, volunteer readers)</td>
<td>a</td>
</tr>
<tr>
<td>(T) Rater</td>
<td>1 = self; 2 = other</td>
<td>a</td>
</tr>
<tr>
<td>(U) Method of data collection</td>
<td>1 = interview; 2 = observation</td>
<td>a</td>
</tr>
</tbody>
</table>

a No statistics are computed because Rater 1 and Rater 2 are constants.
intervention group and a control group at posttest by using Cohen’s d.\textsuperscript{47} When an intervention contained more than 1 outcome domain, we treated each outcome domain as an independent correlate for comparing the effect sizes of different outcome domains. We averaged the effect sizes within the study if 1 outcome domain was measured by multiple tests.\textsuperscript{47} To avoid including more than 1 effect size per construct per sample, we aggregated the effect sizes of different outcome domains by means of averaging to generate a combined effect size\textsuperscript{47,48} called “total psychosocial functioning.” We converted each study-level treatment effect to a standardized mean difference for calculating an overall effect size of all included PCBR interventions on the psychosocial functioning of both children and parents. The precision of effect sizes was addressed by the 95% confidence interval (CI). A combined effect size of the CI does not include 0. The Q statistic was used to test the homogeneity across studies, and significant Qs imply heterogeneity. \textsuperscript{49} \( I^2 \) was used to measure the degree of inconsistency between studies.

Studies were grouped by relevant characteristics to test the impact of moderator variables. This analysis used the coding developed for studies, samples, and interventions (Table 1). These codes were applied as moderator variables for analysis of whether these characteristics were related to the effects of PCBR interventions on psychosocial outcomes of children and parents. The analyses of the impact of the data collection method and rater were conducted at outcome domain level. Other moderator variables were analyzed at study level.

**Publication Bias**

Omitting unpublished studies from this meta-analysis could bias the estimates of the effect of PCBR interventions because studies with significant findings might have more opportunities to be published in peer-reviewed journals than studies with nonsignificant findings. The CMA software was also used to test publication bias.\textsuperscript{47} Visual inspection of the funnel plot was used to address the potential impact of publication bias.\textsuperscript{49} The Begg and Mazumdar’s rank correlation test and Egger’s linear regression method\textsuperscript{51} were used to quantify the bias captured by the funnel plot. The Rosenthal’s fail-safe number was calculated, which reflects the number of missing studies with null or nonsignificant results that would have to be included in the meta-analysis before the \( P \) value becomes nonsignificant.\textsuperscript{47} We used the trim and fill approach to calculate the unbiased effect size if there appeared to be asymmetry around the point estimate.\textsuperscript{52}

**Subgroup Analyses**

We treated outcomes from parents and children separately, as 2 subgroups, for comparing the effect sizes of psychosocial functioning for different groups of recipients (ie, children versus parents). In each study, we aggregated effects within a given intervention to generate a single effect size called “child psychosocial functioning” or “parent psychosocial functioning.”

**RESULTS**

**Study Inclusion**

The electronic database search yielded 3271 records. Hand searching reference lists of the earlier published reviews yielded 16 additional studies related to PCBR. After removing duplicates, 1974 studies remained. After further consideration of title, abstract, and full text, a total of 18 studies\textsuperscript{12–14,16,18,19,53–64} met the selection criteria and were included in the meta-analysis. In Fig 1, we present the study inclusion process.

In 1 of the 18 studies, 2 independent intervention groups were separately compared to 1 control group.\textsuperscript{14} We were interested in both interventions: one was a book gifting intervention, which provided free books to parents to encourage parents to read with their child; whereas the other included parental training related to PCBR. Therefore, we coded the 2 interventions as 2 separate studies. We labeled 1 intervention-control pair as Study 1 and the other as Study 2. Thus, 19 independent interventions reported in 18 relevant studies were assessed in the present meta-analysis.

**Outcome Measures**

Outcome measures of the psychosocial functioning of children included the following:

1. social-emotional adjustment, assessed with the Infant-Toddler Social and Emotional Assessment\textsuperscript{65} and the Parent Rating Scales from the Behavior Assessment System for Children, Second Edition\textsuperscript{66} and the Social Competence Scale\textsuperscript{67};

2. behavior problems, assessed with the Strengths and Difficulties Questionnaire,\textsuperscript{68} the Parental Account of Child Symptoms questionnaire,\textsuperscript{69} and the Eyberg Child Behavior Inventory\textsuperscript{70};

3. quality of life, assessed with the Pediatric Quality of Life Inventory\textsuperscript{71}; and

4. reading interest, assessed with the Brief Reading Interest Scale\textsuperscript{60} and a self-designed questionnaire.

Psychosocial functioning outcome measures for parents included the following:

1. stress and/or depression, assessed with the Parenting Stress Index\textsuperscript{72,73} and the Beck Depression Inventory–Revised\textsuperscript{74};

2. parenting competence, assessed with the Family Involvement Questionnaire,\textsuperscript{75} StimQ-P,\textsuperscript{76} Parent
Involvement Questionnaire, and a self-designed questionnaire;
3. parent-child relationship, assessed with a self-designed questionnaire; and
4. parental attitude to reading with child, assessed with the Parent Reading Belief Inventory, and a self-designed questionnaire.

**Study Characteristics**
The characteristics of studies, participants, and interventions are presented in Table 2.

**Characteristics of Participants**
Nineteen interventions \( (N \text{ subjects} = 3264) \) were provided to different types of children and families. Ten interventions\( ^{14,18,19,53,56-60} \) targeted infants and/or toddlers \( (0–3 \text{ years old}; n = 1856) \) and 9 interventions\( ^{12,13,16,54,55,61-64} \) were tested with preschool-aged children \( (3–6 \text{ years old}; n = 1408) \). The percent of girls participating ranged from 35% to 78%. Of the 15 studies in which researchers reported sufficient information of participants, ~44% were members of ethnic minorities. The majority of the interventions were delivered to children living in at-risk situations (eg, having low incomes, less-educated mothers, behavioral problems, language delay, or living in disadvantaged communities). Mothers were the most common parent included in the interventions. Parents were reported as having low education in 11 interventions \( (n = 2024) \). There were 13 interventions provided to families of low SES \( (n = 2436) \). Ten interventions\( ^{12,14,18,53-57,61,62} \) were conducted in the United States \( (n = 1495) \), and the other \( 9^{13,16,19,57,61-66} \) were also from high-income countries or areas such as the United Kingdom, Australia, and Hong Kong \( (n = 1769) \).

**Characteristics of Interventions**
Interventions were conducted in a range of contexts, including primary care centers or hospitals, participants’ homes, schools, and communities (eg, library, Head Start center, or laboratory). DR techniques were used in 5 interventions \( (n = 1227) \). Five interventions combined PCBR activities with other psychosocial components, such as parenting or child behavior programs \( (n = 955) \). The majority of interventions provided parents with structured training on how to read with children \( (n = 2704) \). Dosage of training ranged from 2 to 28 sessions. Services were delivered to families by using individual models \( (n = 2593) \) or group models \( (n = 671) \). Nine interventions also delivered home visit services to families \( (n = 1475) \). Only 3 interventions employed professionals (eg, people with university degrees in early education or speech pathology) to deliver services \( (n = 595) \). The duration of studies (from pretest to posttest) varied considerably. The longest study lasted for 48 months.
TABLE 2 Characteristics of Participants and Interventions

| Study Name | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S |
| Auger et al12 | 56/58 | 6 | 0 | 47 | 2 (69) | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 18 | 1 | 7 | 1 | 1 | 2 |
| Bierman et al54 | 95/105 | 6 | 53 | 44 | 1 (45) | 1 | 2 | 89 | 1 | 1 | 1 | 1 | 0 | 0 | 10 | 1 | 16 | 1 | 1 | 1 |
| Cates13 | 149/140 | 6 | 7 | 51 | 2 (92) | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 30 | 1 | 1 | 5 | 1 | 0 | 2 |
| DeLoache et al15 | 13/13 | 5 | 56 | 78 | 2 (80) | 1 | 2 | 88 | 2 | 1 | 1 | 4 | 0 | 0 | 3 | 1 | 27 | 2 | 0 | NR |
| Golova et al16 | 63/67 | 5 | 7 | 46 | 2 (100) | 1 | NR | 2 | 1 | 1 | 3 | 0 | 0 | 10 | 0 | 0 | 1 | 0 | 2 |
| Goldfeld et al17 | 34/244 | 6 | 2 | 48 | NR | 1 | NR | 2 | 1 | 2 | 3 | 1 | 0 | 48 | 1 | 4 | 1 | 0 | 2 |
| Heubner18 | 34/14 | 6 | 29 | 39 | 1 (19) | 0 | 1 | 1 | 1 | 2 | 4 | 1 | 0 | 2 | 1 | 2 | 2 | 0 | 2 |
| Kumar et al19 | 14/14 | 5 | 10 | NR | 2 (80) | 1 | 1 | 2 | 1 | 2 | 3 | 0 | 0 | NR | 0 | 0 | 1 | 0 | 2 |
| Lam et al16 | 101/84 | 8 | 56 | 43 | 2 (100) | 1 | 2 | 87 | NR | 2 | 2 | 2 | 1 | 0 | 3 | 1 | 14 | 2 | 0 | 1 |
| Mathis and Bierman12 | 95/105 | 5 | 58 | 55 | 1 (45) | 1 | 2 | 89 | 1 | 1 | 1 | 1 | 1 | 0 | 10 | 1 | 16 | 1 | 1 | 1 |
| O‘Connor et al15 | 69/72 | 9 | 66 | 53 | 2 (76) | 1 | 2 | 80 | 1 | 1 | 2 | 2 | 0 | 1 | 12 | 1 | 18 | 2 | 1 | 2 |
| O‘Hare and Connolly19 | 96/107 | 7 | 24 | NR | NR | 0 | NR | NR | NR | 2 | 1 | 0 | 0 | 3 | 0 | 0 | 1 | 1 | 2 |
| Ortiz et al10 | 12/13 | 4 | 31 | 40 | 1 (8) | 0 | 2 | 96 | 2 | 2 | 1 | 4 | 0 | 0 | 1 | 1 | 3 | 1 | 0 | NR |
| Scott et al81 | 74/78 | 8 | 66 | 53 | 2 (76) | 1 | 2 | 80 | 1 | 1 | 1 | 2 | 2 | 0 | 1 | 6 | 1 | 18 | 2 | 1 | 2 |
| Scott et al82 | 58/51 | 8 | 63 | 30 | 1 (34) | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 1 | 12 | 1 | 28 | 2 | 1 | 2 |
| Wake et al15 | 93/91 | 9 | 50 | 34 | NR | NR | 1 | NR | 1 | 2 | 2 | 1 | 0 | 0 | 12 | 1 | 18 | 1 | 1 | 2 |
| Wake et al84 | 89/83 | 9 | 50 | 34 | NR | NR | 1 | NR | 1 | 2 | 2 | 1 | 0 | 0 | 24 | 1 | 18 | 1 | 1 | 2 |
| Weisleder (study 1)14 | 176/88 | 9 | 7 | 51 | 2 (92) | 1 | 1 | 1 | 1 | 1 | 3 | 0 | 1 | 30 | 1 | 15 | 1 | 0 | 2 |
| Weisleder (study 2)14 | 111/88 | 9 | 7 | 51 | 2 (92) | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 18 | 0 | 0 | 1 | 0 | 2 |

A, sample size: No. participants in intervention and control groups in the posttest; B, method score: CONSORT 2010; C, mean child’s age in mo; D, percent of the sample size constituting girls; E, predominance of child’s race and/or ethnicity (percentage of ethnic minorities): 1 = predominantly white, 2 = predominantly minority; F, child’s at-risk status: 0 = not at risk, 1 = at risk (had low incomes, had less-educated mothers, had behavior problems, had language delay, or lived in a disadvantaged community); G, participating parents: 1 = mothers only, 2 = mothers and fathers; H, parental education: 1 = low, 2 = mix; I, SES: 1 = low, 2 = mix; J, country: 1 = United States, 2 = other than United States; K, delivery context: 1 = home, 2 = school, 3 = primary care center or hospital; L, at-risk status: 0 = not at risk, 1 = yes; M, psychosocial component: 0 = no, 1 = yes; N, duration in mo; O, reported; P, structured training: 0 = no, 1 = yes; Q, delivery method: 1 = individual, 2 = group; R, home visits: 0 = no, 1 = yes; S, staff quality: 1 = professionals (eg, people with a degree in early education or speech pathology), 2 = semiprofessionals (eg, social workers, nurses, physicals, volunteer readers).

The statistically significant Q statistic of 40.010 (P = .002) indicated that the differences among the effect sizes were due to heterogeneity rather than participant-level sampling error. The I^2 value (I^2 = 55.011) indicated that ~55% of total variance among studies was due to heterogeneity.

**Publication Bias**

The CMA software created a funnel plot (Fig 3) of any effect size index on the x-axis by the SE on the y-axis, which visually assessed the possibility of publication bias. Most studies were distributed symmetrically around the combined effect size. Studies at the bottom are clustered toward the right-hand side of the graph, making the effect size bigger than the unbiased effect size. For the rank correlation test, Kendall’s s is 0.345 (P = .019). For Egger’s test, the intercept (b) is 1.289, with a 95% CI from −0.522 to 3.099 (P = .076). The test of Egger’s regression and Begg and Mazumdar’s rank correlation revealed obscure asymmetry in the funnel plot. The classic fail-safe number indicated that 119 additional studies with null or nonsignificant results needed to be added to overturn these significant results negatively. Under the random effects model, the unbiased effect size was 0.174, slightly smaller than 0.185, which indicates that there is a tiny gap between the real effectiveness and the calculated effectiveness.

**Explaining the Variability in Effect Sizes**

Because the assumption of homogeneity between studies was rejected, further analysis was undertaken to assess whether the characteristics of the studies could account for the variance. Among the 21 variables listed in Table 1 that were analyzed for their impact as moderator variables, only 2 contributed significantly to...
between-group variance. These were the method of data collection (observation less than interview; $Q_b = 7.497; P < .001$) and rater (reported by others less than self-reported; $Q_b = 21.368; P < .001$).

### Subgroup Analyses

In 14 interventions, researchers assessed the psychosocial performances of parents ($n = 2642$), and in 10 studies, researchers assessed the outcomes of children ($n = 1884$). Small effect sizes were found for parent psychosocial functioning ($d = 0.219; 95\% CI: 0.091$ to $0.348; Q = 24.673; P = .025$) and child psychosocial functioning ($d = 0.157; 95\% CI: 0.004$ to $0.310; Q = 16.341; P = .060$). Although the effect size of parents’ outcomes was larger than children’s, there was no significant difference in the effects of PCBR interventions on psychosocial outcomes of parents and children ($Q_b = 0.376; P = .540$). Different psychosocial outcomes of parents and children were examined and findings are presented in Table 3.

## DISCUSSION

### Summary of Evidence

PCBR is commonly considered as one of the most important activities within the family context. Our meta-analysis was undertaken in an attempt to assess the effects of PCBR interventions on psychosocial functioning in general. Combining the results of 19 interventions and representing 3264 families, our analysis produced a mean weighted
effect size that was small but significant (at 0.185). In our review, we suggest that PCBR interventions may be superior to control for improving the psychosocial functioning of both children and parents.

PCBR is a complex social process occurring within an interpersonal context, which supports a broad range of outcomes for both children and their parents.26,27,80,81 Demonstrated in our synthesis is that PCBR interventions might positively impact children’s social-emotional competence, quality of life, and reading interest. Behaviors and responses of children may also impact the competence or well-being of parents. PCBR interventions might be effective in improving parents’ parenting competence, attitudes to reading with their child, and the quality of their relationships with children. It may also assist in reducing their stress or depression. We found no statistically significant difference in the impacts of PCBR interventions on psychosocial outcomes of parents and children. Thus, prioritizing 1 group of participants’ outcomes over another (whether children or parents) may ignore the potential of PCBR interactions.8

In our review, we found that the psychosocial effects of PCBR were similar, despite the characteristics of participating children. Although age may impact the effectiveness of PCBR interventions in improving children’s acquisition of literacy,40 PCBR interventions appear to have similar psychosocial effects on both older children (3–6 years old) and younger children (0–3 years old). In contrast with previous research in which a child’s sex was considered as an important factor when interpreting PCBR interactions,24 our review did not find that a child’s sex could predict the psychosocial effects of PCBR interventions.

In our review, we support that children who were socioeconomically or culturally disadvantaged might equally benefit from PCBR interventions as their counterparts. For example, we found that the psychosocial effects of PCBR were not dependent on the race and/or ethnicity of children, although it has been indicated in previous research that white families might benefit more from PCBR activities than minority families.1 Moreover, in this review, we did not find support for the expected moderating effects of at-risk status of children (eg, having low incomes, less-educated mothers, behavioral problems, language delay, or living in a disadvantaged community) on the psychosocial effects of PCBR interventions. In fact, children living in at-risk status or from families of low SES or a minority ethnicity may need more reading-related support because they may have fewer educational resources than their counterparts. In many previous studies, researchers have also shown the success of PCBR programs for children from high-risk families, such as children whose parents were in prison,82 children whose mothers were teenagers,19,83 and children who were from homeless families.84

In the current review, we found that the length of the study and dosage of PCBR intervention were not predictive of psychosocial

<table>
<thead>
<tr>
<th>Outcomes of the Effects of PCBR Interventions</th>
<th>No. Studies</th>
<th>Study Name</th>
<th>No. Samples</th>
<th>Random Effect Size (95% CI)</th>
<th>Heterogeneity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children</td>
<td>10</td>
<td>Bierman et al,14 Weisleder et al (study 1),14 Weisleder et al (study 2)14</td>
<td>1884</td>
<td>0.157 (0.004 to 0.310)</td>
<td>16.341 9 .060 44.924</td>
</tr>
<tr>
<td>Social-emotional adjustment</td>
<td>3</td>
<td>Scott et al,51 Scott et al,52 Wake et al,51 Wake et al54</td>
<td>663</td>
<td>0.157 (−0.010 to 0.324)</td>
<td>0.162 2 .922 0.000</td>
</tr>
<tr>
<td>Behavior problem</td>
<td>4</td>
<td>Scott et al,51 Scott et al,52 Wake et al,51 Wake et al54</td>
<td>617</td>
<td>−0.025 (−0.202 to 0.125)</td>
<td>4.377 3 .224 31.456</td>
</tr>
<tr>
<td>Quality of life</td>
<td>2</td>
<td>Wake et al,51 Wake et al54</td>
<td>356</td>
<td>0.050 (−0.158 to 0.258)</td>
<td>0.134 1 .715 0.000</td>
</tr>
<tr>
<td>Reading interest</td>
<td>3</td>
<td>Lam et al,18 Kumar et al,19 Ortiz et al19</td>
<td>248</td>
<td>0.526 (0.260 to 0.791)</td>
<td>1.720 2 .423 0.000</td>
</tr>
<tr>
<td>Parents</td>
<td>14</td>
<td>Cates,18 Heubner,58 Kumar et al19</td>
<td>2642</td>
<td>0.219 (0.091 to 0.348)</td>
<td>24.673 13 .025 47.311</td>
</tr>
<tr>
<td>Stress and/or depression</td>
<td>3</td>
<td>Lam et al,18 Kumar et al19</td>
<td>365</td>
<td>0.314 (0.065 to 0.563)</td>
<td>2.981 2 .225 32.912</td>
</tr>
<tr>
<td>Parenting competence</td>
<td>8</td>
<td>Bierman et al,54 DeLoache et al,51 Goldfeld et al,57 Lam et al,18 Mathis and Bierman,17 O’Connor et al,13 Scott et al,51 Scott et al52</td>
<td>1468</td>
<td>0.288 (0.030 to 0.425)</td>
<td>16.702 6 .010 64.075</td>
</tr>
<tr>
<td>Parent-child relationship</td>
<td>2</td>
<td>Lam et al,18 O’Connor et al,13</td>
<td>336</td>
<td>0.222 (0.007 to 0.437)</td>
<td>1.664 1 .197 39.900</td>
</tr>
<tr>
<td>Attitudes to reading with child</td>
<td>4</td>
<td>Auger et al,53 Golova et al,56 O’Hare and Connolly,19 Kumar et al19</td>
<td>475</td>
<td>0.372 (−0.071 to 0.814)</td>
<td>10.399 3 .015 71.150</td>
</tr>
</tbody>
</table>

df, degrees of freedom.
effectiveness. There are other variables that were not assessed in the included studies that may be influencing factors, such as the contents and text features of books and the quality of parent-child interactions. Moreover, provision of DR training may not have an impact on the general psychosocial effectiveness of PCBR interventions. It is suggested in the meta-analysis that shared reading as a meaningful interaction between children and parents rather than specific reading techniques might be the key to the positive psychosocial effects of PCBR interventions. We believe that PCBR is a low cost and simply adapted approach for any parent-child dyad, no matter what the circumstances.

Conducting this meta-analysis allowed us to assess the current state of the research on PCBR interventions. We found a limited number of studies that met the selection criteria. Future researchers should pay more attention to the quality of study design because many PCBR-related studies identified in our search were excluded because of not employing an RCT design. Also, validated scales were not commonly used to evaluate psychosocial effects of PCBR interventions, especially on the quality of parent-child relationships. PCBR is not only a process of communicating information or learning skills but also a socially created, interactive process. Using validated scales to assess its effects on parent-child relationships may improve our understanding about the dynamics of PCBR interactions. In our review, we also identified that only a limited number of the reported PCBR interventions involved fathers. Future PCBR interventions should be designed to attract the participation of fathers because of the importance of father-child interactions in the development of children.

Limitations
First, because of our strict inclusion criteria, we were able to include only a limited number of studies. The ratio of moderating variables to the included studies limits interpretation of the findings and potentially renders this review as an exploratory process. Second, dissecting interventions in the included studies was problematic because authors of some studies reported on interventions with combined reading and psychosocial components (e.g., parenting programs and child behavior programs). It was therefore difficult to extract and conclude the role of PCBR components in these multiple interventions. Third, we identified and included a broad range of psychosocial outcomes from the included studies. For example, we included studies in which the effects of PCBR on reading interests of children and parental attitudes of reading with their child were assessed. To make sense of these different measures, we treated reading interest as personal competence of children and positive attitudes in reading with children as an important parenting competence. Whether the studies were similar enough to be combined may be questioned because of the various measures of psychosocial functioning included in the review. However, the goal of this review was to explore the pattern of psychosocial effectiveness of PCBR interventions by assessing psychosocial effectiveness of PCBR interventions in general. The method we used to calculate effect sizes was suggested by Borenstein et al and has been also used in previous studies as well. We recognized the limitation and addressed the diversity by applying the random effects model and reporting the range of true effects. We also interpreted the variability by testing the effects of moderator variables.

CONCLUSIONS
Exploring and assessing psychosocial effects of shared reading between parents and children allow us to extend the implications of PCBR interventions. A large number of family interventions have traditionally targeted behavioral problems of children instead of the interactions or relationships between parents and children. Because of the limited long-term efficacy of an individual-focused approach, more and more scholars have highlighted the importance of relationship-focused interventions. Moreover, psychosocial interventions targeting children have usually required traditional face-to-face therapies, which require intensive resources, especially including professional therapists. The delivery of these interventions has also posed challenges when children return to their families, if their families are not able to assist in the therapy. PCBR programs can improve psychosocial functioning of children through empowering parents, which may be more cost-effective than face-to-face therapies for children alone.

In summary, suggested in our meta-analysis findings is that PCBR interventions might positively impact the psychosocial functioning of both parents and children. It seems prudent to consider the application of PCBR in improving the psychosocial well-being of families, especially those at high risk.

ABBREVIATIONS
Cl: confidence interval
CMA: Comprehensive Meta-Analysis
CONSORT: Consolidated Standards of Reporting Trials
DR: dialogic reading
PCBR: parent-child book reading
RCT: randomized controlled trial
SES: socioeconomic status
REFERENCES


10. Aram D, Aviram S. Mothers’ storybook reading and kindergartners’ socioemotional and literacy development. Read Psychol. 2009;30(2):175–194


28. Williams KD. The Effects of an Interactive Reading Intervention on Early Literacy Development and Positive Parenting Interactions for Young Children of Teenage Mothers [dissertation]. Eugene, OR: University of Oregon; 2000


32. Ro E. Conceptualization of Psychosocial Functioning: Understanding Structure and Relations With Personality and Psychopathology [doctoral thesis]. Iowa City, IA: The University of Iowa; 2010


47. Borenstein M, Hedges LV, Higgins JPT, Rothstein HR. Introduction to Meta- Analysis. West Sussex, United Kingdom: John Wiley & Sons Ltd; 2009


49. Egger M, Davey Smith G, Schneider M. Minder C. Bias in meta-analysis detected by a simple, graphical test. BMJ. 1997;315(7109):629–634


Psychosocial Effects of Parent-Child Book Reading Interventions: A Meta-analysis
Qian-Wen Xie, Celia H.Y. Chan, Qingying Ji and Cecilia L.W. Chan
Pediatrics originally published online March 27, 2018;

Updated Information & Services
including high resolution figures, can be found at:
http://pediatrics.aappublications.org/content/early/2018/03/23/peds.2017-2675

References
This article cites 74 articles, 10 of which you can access for free at:
http://pediatrics.aappublications.org/content/early/2018/03/23/peds.2017-2675.full#ref-list-1

Subspecialty Collections
This article, along with others on similar topics, appears in the following collection(s):
Developmental/Behavioral Pediatrics
http://classic.pediatrics.aappublications.org/cgi/collection/developmental_issues_sub
Psychosocial Issues
http://classic.pediatrics.aappublications.org/cgi/collection/psychosocial_issues_sub

Permissions & Licensing
Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at:
https://shop.aap.org/licensing-permissions/

Reprints
Information about ordering reprints can be found online:
http://classic.pediatrics.aappublications.org/content/reprints
Psychosocial Effects of Parent-Child Book Reading Interventions: A Meta-analysis
Qian-Wen Xie, Celia H.Y. Chan, Qingying Ji and Cecilia L.W. Chan
Pediatrics originally published online March 27, 2018;

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://pediatrics.aappublications.org/content/early/2018/03/23/peds.2017-2675