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Parental, community and familial support for children's literacy in developing countries

A systematic review

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Parental, community and familial support for children's literacy in developing countries: a systematic review

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Abstract

Background

For a majority of the world's children, despite substantial increases in primary school enrollment, academic learning is neither occurring at expected rates nor supplying the basic foundational skills necessary to succeed in the 21st century. The significant lag in academic achievement tells us that simply making formal education available does not fully meet children's needs for literacy development. Globally, many interventions are used to support children's literacy development through channels outside of the formal education system, in children's homes or communities. However, there is a lack of information regarding the effectiveness of these interventions.

Objectives

The objective of this systematic review was to examine the effectiveness of parental, familial, and community support for children's literacy development in developing countries. This review was intended to provide information about the contextual influences of parental, familial, and community support on children's literacy development skills through the use of interventions that target those influences.

We explored the following questions:

1. What models of reading and literacy learning programs have been implemented in homes and communities in low- and middle-income countries (LMICs)?
2. What models of reading and literacy learning programs implemented in homes and communities in LMICs have empirical evidence regarding their level of effectiveness?
3. How effective are these models in improving children's literacy outcomes?

Search Methods

Searches for academic literature were conducted in 15 online databases from across the disciplines of anthropology, economics, education, international relations, political science, psychology, and sociology. To capture gray literature, we searched the websites of United Nations agencies, multinational organizations that provide relevant programming, and governmental agencies. For example, we searched the websites of UNICEF, UNESCO, 3ie, J-PAL, USAID and others. Project staff and advisory panel members identified literature from their own organizations, and reached out to their contacts to ask for grey literature. The search was conducted from May to July, 2013.

Selection Criteria

To be included in this review, studies had to have been published in 2003 or later and include a test of an intervention involving parents, families, or community members with the goal of improving children's literacy development; children ages 3 to 12 years (or "preprimary" or "primary school" age); a comparison group; and they had to take place in an LMIC (according to 2012 World Bank classification). Studies that addressed educational radio were eliminated from consideration because a systematic review of the impact of educational radio already exists (Ho & Thukral, 2009).

Data Collection and Analysis

Mendeley software was used to manage citations, abstracts, and documents. Abstracts from each database were initially screened by a single reviewer, but in fact many studies were cited in multiple databases and in turn were screened by two or more reviewers. For the

studies that passed the screening, two researchers then independently reviewed each to ensure that it met the criteria for inclusion in this review. Thirteen studies were ultimately identified for this review. Information was extracted regarding the study setting, process used to form the control or comparison group, independence of the evaluation, outcome measures, attrition, baseline equivalence on child preliteracy or literacy learning, descriptions of the treatment and comparison conditions, characteristics of participants and implementers, and statistics required for meta-analysis (where available). Ten studies were included in meta-analyses. Eight of the studies were cluster randomized or quasi-experimental trials, where the level of assignment was at the school or district level. For these studies, effect sizes were computed using Hedges' (2007) d_{T2} effect size assuming equal cluster sample sizes.

Results

The initial search of both the academic and gray literature yielded 10,430 study abstracts. Title and abstract screening resulted in the elimination of 10,357 studies, and 21 duplicate citations were removed. Of the remaining 52 studies, 3 were eliminated for addressing the topic of educational radio, and 36 for failure to meet our inclusion criteria. This left the 13 studies that were ultimately included in this review. These studies fell into three topic areas: educational television, interventions that help parents learn how to support their children's school readiness, and tutoring interventions delivered by peers or other community members. Most of these studies involved interventions to improve school readiness.

The three areas of intervention were examined separately, and studies were combined for meta-analysis in cases where they used the same intervention approach (and had the required statistical information available).

Five studies provided effect size estimates for interventions that help parents support their children learning. Three of the five studies reported significant differences in baseline literacy scores. For overall literacy immediately after the intervention, the effect sizes from five studies including a total of 864 children were heterogeneous, with a mean effect of 0.35 and a 95 percent confidence interval that included 0 [-0.07, 0.77]. Four studies including a total of 786 children provided information about overall literacy at one-year follow-up. These effect sizes were also heterogeneous, with a mean effect of 0.48 and a 95 percent confidence interval that included 0 [-0.35, 1.30]. Five studies of child-to-child tutoring were included in the meta-analysis. These studies all reported difficulties in data collection, raising questions about the quality of data included in the evaluation. For the total reading post-test, the effect sizes from four studies including a total of 1,779 children were heterogeneous, with a mean of 0.15, and a 95 percent confidence interval that included 0 [-0.27, 0.58]. For the beginning reading sub-test, four studies including 1,767 children were also heterogeneous, with a mean of -0.107 and a 95 percent confidence interval that included 0 [-0.40, 0.18]. For the letter identification posttest, effect sizes from five studies including 2,300 children were heterogeneous with a mean of 0.22, and a 95 percent confidence interval that included 0 [-0.13, 0.57]. For the writing post-test, five effect sizes including 1,993 children were heterogeneous, with a mean of 0.27 that was significantly different from 0 (95 percent confidence interval: [0.02, 0.51]). For the follow-up test of reading achievement, effect sizes from three studies including 1,407 children were heterogeneous, with a mean effect size of 0.07 and a 95 percent confidence interval that included 0 [-0.36, 0.04]. For the follow-up test of writing achievement, effect sizes from three studies including 1395 students were homogeneous with a mean of 0.033 that was not significantly different from zero (95 percent

confidence interval: [-0.10, 0.17]. For the follow-up test of overall literacy, effect sizes from three studies including 1,397 children were homogeneous with a mean effect size of 0.06 that was not statistically different from zero (95 percent confidence interval: [-0.15, 0.26].

Authors' Conclusions

This review identified four areas where evidence was available regarding the effectiveness of an intervention approach: educational television, educational radio, interventions intended to support parents' ability to develop their children's school readiness, and tutoring (provided by older peers or community members). Educational radio has been addressed elsewhere (see Ho & Thukral, 2009), so it was not considered in this review. Educational television had a positive impact on young children's literacy development if the child viewed the programming three to five times per week (but not at a lower dosage). Interventions intended to support parents' ability to develop their child's school readiness were not found to be effective overall, although they did have some positive effects in some countries. Peer-led tutoring was found to improve children's school readiness in writing, but not in other areas of literacy. However, this approach did have significant effects across multiple areas of literacy in some country contexts. A tutoring program led by community members resulted in increases in children's literacy.

There were several limitations to this review based on the scarcity of empirical studies and their limited focus on just a few interventions. Numerous descriptions of interventions exist, but few contained a study of program effectiveness in reference to a comparison group. We found only one study that addressed an intervention for children ages 7 and older, and found no eligible studies from Latin America. Therefore, we are left with significant gaps in our understanding of what works in LMICs to improve children's literacy outcomes using interventions outside of the formal education system.

Content

Abstract ..... **III**
List of figures and tables ..... **vii**
1. Background **1**
1.1 Description of the problem 1
1.2 The intervention 1
1.3 How the intervention might work 2
1.4 Why it is important to conduct this review 2
2. Objectives **5**
3. Methods **6**
3.1 Title registration and review protocol 6
3.2 Criteria for considering studies for this review 6
3.3 Search methods for identification of studies 7
3.4 Data collection and analysis 9
4. Results **15**
4.1 Results of the search 15
4.2 Description of studies 18
4.3 Risk of bias in included studies 25
4.4 Synthesis of results 26
5. Discussion **35**
5.1 Summary of main results 35
5.2 Overall completeness and applicability of evidence 35
5.3 Quality of the evidence 36
5.4 Limitations and potential biases in the review process 36
5.5 Agreements and disagreements with other studies and reviews 37
6. Authors' conclusions **38**
6.1 Implications for practice and policy 38
6.2 Implications for research 39
7. Information about this review **40**
7.1 Review authors 40
7.2 Roles and responsibilities 43
7.3 Sources of support 44
7.4 Declaration of interest 44
7.5 Plans for updating the review 44
7.6 Author declaration 44
8. Data and analyses **61**
8.1 Parent support interventions 61
8.2 Tutoring interventions 66
References **80**

List of figures and tables

Figure 1: Nonschool Contextual Pathways to Literacy Learning 4
Figure 2: Study Selection Process 15
Figure 3: Areas With and Without Rigorous Evidence 17

Table 1: Online Databases Searched 7
Table 2: Search Strings 8
Table 3: Included Studies 16
Table 4: Summary of Included Studies 21
Table 5: Parent Education Studies: Overall Literacy of Year 1 28
Table 6: Parent Education Studies: Overall Literacy of Year 2 (Grade 1) 28
Table 7: UNICEF Child-to-Child Studies: Reading Total Score of Year 1 31
Table 8: UNICEF Child-to-Child Studies: Beginning Reading Subtest of Year 1 31
Table 9: UNICEF Child-to-Child Studies: Letter Identification Subtest of Year 1 32
Table 10: UNICEF Child-to-Child Studies: Writing Subtest of Year 1 32
Table 11: UNICEF Child-to-Child Studies: Reading Achievement of Year 2 (Grade 1) 33
Table 12: UNICEF Child-to-Child Studies: Writing Achievement of Year 2 (Grade 1) 33
Table 13: UNICEF Child-to-Child Studies: Overall Literacy of Year 2 (Grade 1) 34
Table 14: List of Excluded Studies 45
Table 15: Attributes of the Study of Jalan Sesama 48
Table 16: Attributes of the Study of Will You Play With Me? 49
Table 17: Attributes of the Study of the Family Supported Reading Program 50
Table 18: Attributes of the Study in Armenia of OSI's Getting Ready for School 51
Table 19: Attributes of the Study in Bosnia and Herzegovina of OSI's Getting Ready for School 52
Table 20: Attributes of the Study in Kazakhstan of OSI's Getting Ready for School 53
Table 21: Attributes of the Study in Tajikistan of OSI's Getting Ready for School 54
Table 22: Attributes of the Evaluation in Bangladesh of UNICEF's Getting Ready for School: A Child-to-Child Approach 55
Table 23: Attributes of the Evaluation in Democratic Republic of Congo of UNICEF's Getting Ready for School: A Child-to-Child Approach 56
Table 24: Attributes of the Evaluation in Ethiopia of UNICEF's Getting Ready for School: A Child-to-Child Approach 57
Table 25: Attributes of the Evaluation in Tajikistan of UNICEF's Getting Ready for School: A Child-to-Child Approach 58
Table 26: Attributes of the Evaluation in Yemen of UNICEF's Getting Ready for School: A Child-to-Child Approach 59
Table 27: Attributes of the Evaluation of Read India 60
Table 28: Summary Statistics for Parent Support Interventions, Part I 61
Table 29: Summary Statistics for Parent Support Interventions, Part II 63
Table 30: Statistics for UNICEF Getting Ready for School: A Child-to-Child Approach Studies, Part I 66
Table 31: Statistics for UNICEF Getting Ready for School: A Child-to-Child Approach Studies, Part II 71
Table 32: Statistics for Read India 79

1. Background

1.1 Description of the Problem

For a majority of the world's children, despite substantial increases in access to primary school, academic learning is neither occurring at expected rates nor supplying the basic foundational skills necessary to succeed in the 21st century. As of 2010, approximately 61 million primary school–age children worldwide were not attending school. Among those attending school, academic learning is far from assured. For example, only 46 percent of children in Nicaragua achieve Grade 4 learning standards, a figure that drops to less than 5 percent in Malawi. In Ghana, as of 2008, four out of five young women who had completed Grade 6 were still illiterate or only partially literate (UNESCO, 2012). The significant lag in academic achievement tells us that schools alone do not fully meet children's needs for literacy development. Many reasons exist for these challenges in providing adequate literacy instruction within the school context. For example, a World Bank study found an average 19 percent teacher absence rate across Bangladesh, Ecuador, India, Indonesia, Peru, and Uganda; and, many teachers who were physically present were not spending their time teaching (Chaudhury, Hammer, Kremer, Muralidharan, & Rogers, 2006). Even when both children and teachers are in the classroom, student learning can be significantly hampered by unfamiliarity with the language of instruction (Ball, Paris, & Govinda, 2014), large class sizes because of an insufficient number of teachers, and teacher assignment practices that disproportionately allocate the lowest-performing teachers to the communities with the highest needs (UNESCO, 2014). Despite efforts and innovations in many countries, these problems will not be solved quickly, and alternative approaches are needed to support children's literacy development. There is also a general lack of empirical research in low- and middle-income country (LMIC) contexts (Wagner, 2014).

Numerous initiatives are underway globally to try to improve children's literacy development, including interventions that work through parents, families, and communities. These initiatives are intended to supplement children's school-based learning or provide alternatives for children who do not have access to preprimary or primary education. Examples of such interventions include tutoring and peer-assisted learning, mobile libraries, programs to build parental knowledge of how to support children's literacy, literacy instruction outside regular schools (e.g., in the context of religious education), and the provision of educational media for use outside regular classroom instruction.

There are numerous such interventions in LMICs, but there is little information regarding which interventions have evidence for (or against) their effectiveness, and what that evidence reveals. Therefore, this review addresses evidence of what works to improve children's literacy development in LMICs, with interventions that focus on children between 3 and 12 years old and work through parents, families, and communities.

1.2 The Intervention

We drew on two dimensions of learning: (1) contexts that support literacy learning and (2) learning outcomes in the areas of preliteracy and literacy. Ecological models have demonstrated that the most proximal contexts—particularly school, home, and community—are among the strongest influences on learning (Christenson & Reschly, 2010; Dickinson & Neuman, 2006). Within these contexts, influences can be categorized as human (e.g., families) and nonhuman (e.g., print). There have been studies of human influences, such as parent and child shared book reading, peer-to-peer learning, and community volunteers

(Britto, Brooks-Gunn, & Griffin, 2006; Britto, Oketch, & Weisner, 2014). Nonhuman influences include access to print, learning resources, and mobile libraries; and access to print and learning support through digital means, such as educational radio or television and other technologies (Doiron, 2011). Although nonhuman influences require some human involvement (such as turning on an educational television program), the primary mode of delivering the literacy support is through the nonhuman materials rather than the human actions. Human and nonhuman influences can intersect to support children's learning. For example, nonhuman interventions may rely on community and parental engagement to support implementation (Lancy, Bock, & Gaskins, 2010), often with support from international organizations, nongovernmental organizations (NGOs), and community based-organizations (Hoppers, 2006).

1.3 How the Intervention Might Work

Because literacy skills are acquired progressively, this study used a developmental lens that frames literacy from emergent preliteracy skills to reading and writing. Therefore, this review includes interventions that are intended to improve children's literacy development at any point from the preprimary period through middle childhood (i.e., 3 to 12 years old). The conceptual framework for this study drew on the contextual pathways that are linked with literacy from this developmental perspective.

Four features characterize this model (see Figure 1):

- Proximal contextual supports for literacy include the family and the community. The model differentiates family-level supports from community-level supports. These supports may supplement, complement, or compensate for more formal preschool- and school-based contextual influences.
- Pathways between these supports and child literacy outcomes can be mediated by three dimensions: (1) attitudes, beliefs, and expectations of families and communities regarding children's literacy learning; (2) availability of resources, such as knowledge and print materials; and (3) the nature, quality, and quantity of interactions and practices that families and communities engage in to promote literacy.
- Community members or organizations can affect child literacy outcomes by engaging with children directly or acting on families (who in turn engage with children).
- Given the evidence that early learning is one of the strongest predictors of later literacy skills, from a developmental perspective, the model considers outcomes for children between 3 and 12 years old.

In some family or community contexts, one or more of the pathways shown in Figure 1 may be weak or nonexistent, reducing the likelihood that a child will reach his or her full potential with regard to literacy development. The interventions that were considered for the current review were expected to act on one or more weak or missing pathways, leading to improvements in children's literacy development.

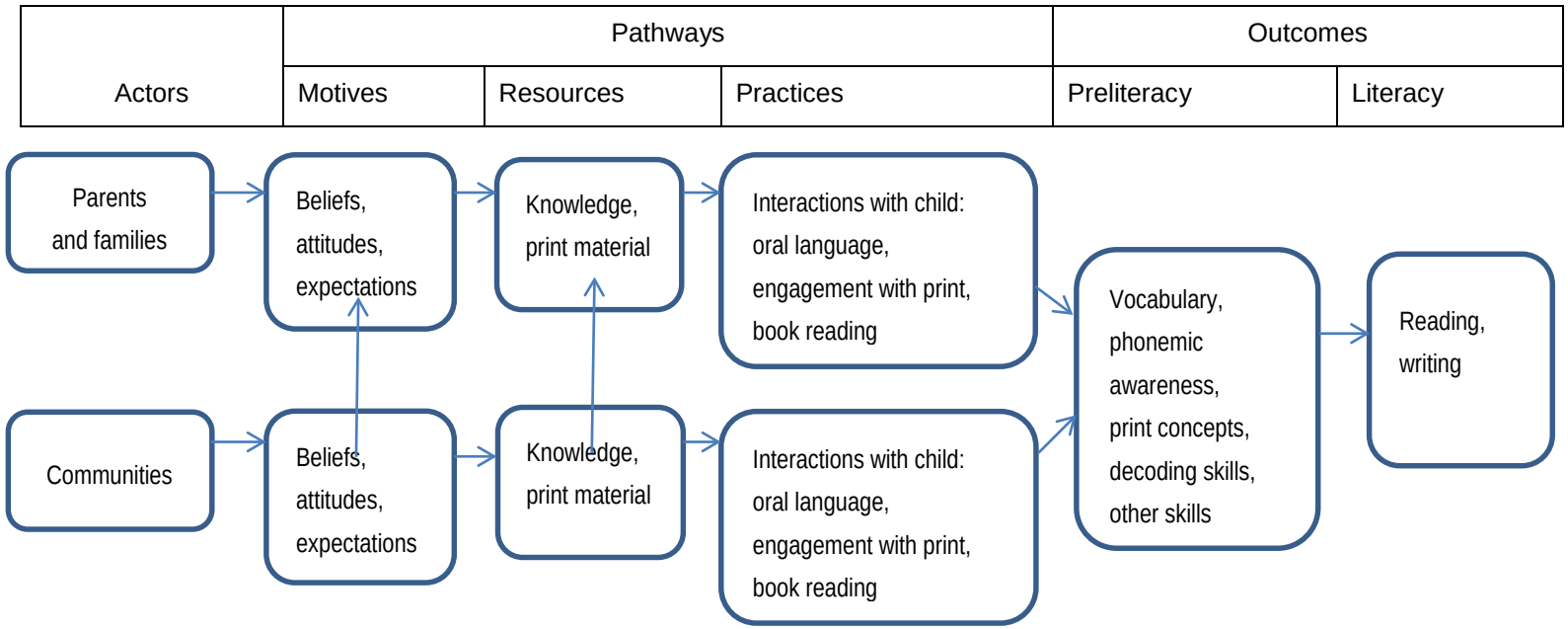
1.4 Why It Is Important to Conduct This Review

Policy makers and practitioners at the country level and in multinational organizations increasingly want to select interventions that have documented, reliable evidence of their effectiveness. As discussed previously, poor literacy development is a persistent and significant concern in many countries. However, the published research literature available outside industrialized nations is quite limited, albeit growing, and there is a dearth of high-

quality, quantitative studies. There also is a lack of balance in the quality and the quantity of evidence for the effectiveness of interventions across different contexts (e.g., more literature available from some countries or regions than others).

The field will benefit from knowing the types of interventions that have been subject to rigorous evaluation, as well as the evidence produced by those evaluations. We found significant gaps in the availability of evidence for what works to improve children's literacy development in LMICs outside the formal education system. By highlighting the availability of evidence, our review may inform the effective allocation of evaluation resources.

Figure 1: Nonschool Contextual Pathways to Literacy Learning



2. Objectives

The objective of this systematic review was to examine the availability of evidence and what that evidence says about the effectiveness of interventions to improve parental, familial, and community support for children's literacy development in developing countries. This review provides information about the contextual influences of parental, family, and community support on children's literacy development skills by using interventions that target those influences.

We explored the following questions:

1. What models of reading and literacy learning programs have been implemented in homes and communities in low- and middle-income countries (LMICs)?
2. What models of reading and literacy learning programs implemented in homes and communities in LMICs have empirical evidence regarding their level of effectiveness?
3. How effective are these models in improving children's literacy outcomes?

The overarching goals of this review are to (1) increase the availability of information for evidence-based decision making for international agencies, NGOs, and government policy makers who select programming for children, and (2) identify evidence gaps regarding the effectiveness of interventions currently in use.

3. Methods

3.1 Title registration and review protocol

The title for this systematic review was registered on September 2, 2013. The systematic review protocol was approved on September 1, 2014. Both the title registration and the protocol are available in the Campbell Library at: www.campbellcollaboration.org/lib/

3.2 Criteria for Considering Studies for This Review

3.2.1 Eligible designs

Eligible studies were required to include both a treatment group and a comparison group. Eligible designs included randomized control trials (RCTs) and regression discontinuity designs. We also included quasi-experimental studies, provided that there was a valid comparison group. In the registered review protocol, we specified that to be "valid," the comparison group (1) must be drawn from the same population as the intervention group, and (2) must have baseline data available that demonstrates no pre-existing differences on outcomes of interest. However, given the small number of studies available, we did not exclude quasi-experimental studies that had unequal baseline scores on outcomes of interest (a deviation from the protocol). We excluded single-group, pre-post designs because of their weak internal validity. All other quasi-experimental study designs were eligible to the extent that methods existed for computing an appropriate measure of effect size. Purely descriptive studies were not included.

3.2.2 Types of participants

The target population was children between 3 and 12 years old living in low- and middle-income countries (LMICs), as defined by the World Bank's country income classification. In some countries, many children's births are not registered, and exact ages may be unknown. Therefore, in the absence of information regarding exact ages, we accepted studies with children described as being of preprimary or primary school age. Studies that focused on children with disabilities were eligible for inclusion, even though disabilities are not a distinct topic of interest here.

3.2.3 Types of interventions

Included studies were primary studies of interventions, not literature reviews or meta-analyses. Each intervention addressed literacy or preliteracy skills and was delivered through family or community members. Interventions delivered within a school setting were eligible for inclusion *only* if the delivery mechanism was the family or community members. In addition, different types of interventions (e.g., cash transfers, vouchers, libraries) were included if their purpose was to address literacy outcomes and they were not delivered in formal schooling. The intervention could be a program, a product, a policy, or a practice; however, the primary focus of the study must have been aligned with the topic area of literacy.

3.2.4 Types of outcome measures

Eligible preliteracy and literacy outcomes included a full range of skills, including phonemic awareness, listening, vocabulary, speaking, pronunciation, print concepts, knowledge of the alphabet, reading (comprehension, fluency), sight reading of words, writing, spelling, and narrative development. Preliteracy and literacy outcomes were required to be assessed with standardized measures, country-specific or locally used assessments, or assessments

developed for the evaluation (to the extent that they were not overaligned with the contents of the intervention).

3.2.5 Types of literature

Documents were included if they were published in 2003 or later. Studies from more than 10 years ago have a high likelihood of assessing interventions that are no longer in use or are no longer being implemented in the same context (e.g., children's access to primary education, parental literacy, and the use of first-language instruction have all increased in many LMICs during the last decade).

We searched for studies in English, Spanish and French. We also identified some studies with English language abstracts but text in Turkish, and these studies were screened by a native Turkish speaker with expertise in education research.

Unpublished studies of eligible interventions such as dissertations or research reports from government agencies and NGOs were included. Documents such as PowerPoint presentations, internal agency memos, editorials and notes, student term papers, advertisements or promotional materials, editorials, letters, case series, and personal communication notes were excluded.

3.3 Search Methods for Identification of Studies

3.3.1 Electronic searches

Studies included in this systematic review were obtained from electronic academic literature, gray literature, and key informant solicitation. Searches for academic literature were conducted in online databases from across diverse disciplines (shown in Table 1).

Table 1: Online Databases Searched

Discipline	Resource(s)
Anthropology	Africa-Wide NiPAD
Economics	EconLit
Education	Education Research Complete (EBSCO); Education Research Information Center (ERIC)
Interdisciplinary	Arts and Humanities Index; Web of Science; FRANCIS
International Relations	Public Affairs Information Service (PAIS)

Political Science	Worldwide Political Science Abstracts
Psychology	PsycINFO
Social Sciences	Academic Search Premiere; Campbell Collaboration; Social Science Citation Index; Social Sciences Full Text (H. W. Wilson); Sociological Abstracts

A list of search terms was used to search the electronic databases (Table 2). To ensure that the searches are reliable across the three search strategies, the exact same concepts—phases of human development (early and middle childhood), and home and community-based learning—were searched. Because each of the electronic databases selected for the academic literature search uses different vocabularies to index its subjects and topics, the search terms needed to be adapted for each database, although the concepts of the phases of human development (early and middle childhood) and home and community-based learning remained constant. We also used a core set of search terms common to all databases, such as read* and lit*.

Table 2: Search Strings

Search String	"child*" or “youth*” or “pre-reader*” or “low-readiness reader*” or “girl*” or “gender” or “boy”
AND	"READING achievement" OR "READING comprehension" OR "LITERACY education" OR "FAMILY literacy programs" OR "COMMUNITY education" OR "PARENT participation in children's reading" or "READING intervention" OR "LITERACY programs" or “read*” or “liter*”
AND	“assessment*” or “effect*” or “evaluat*” or “impact*” or “outcome*” or “interven*” or “program*” or “trial*” or “deliver*” or “service*”
AND	“family literacy” or “community involvement” or “community support” or “collaborative learning” or “facilitator*” or “learning resources” or “community centers” or “community organizations” or “community-based education” or “community-based” or “home-based” or “parent*” or “famil*” or “caregiv*” or “center” or “centre” or “home*” or “communit*” or “librar*”
OR	“READING achievement” or “READING comprehension” or "alphabet” or “basic skills” or “coaching” or “cognitive skills” or “collaborative learning” or “comprehension” or “ECD program*” or “educat*” or “fluency” or “language” or “learn*” or “lexical” or “lexicon” or “linguistic” or “listening” or “narrative” or “morphem*” or “non-formal” or “informal” or “non-formal education” or “informal education” or “parental speech” or “phonem*” or “phonological” or “print” or “pronunciation” or “read*” or “sentence” or “sight words” or “spell*” or “stor*” or “storybook” or “syllable*” or “syntax” or “text” or “vocabulary” or “write” or “writing” or “written language” or “written text” or “word”

AND	“Afghanistan” or “Angola” or “Armenia” or “Asia Pacific Region” or “Bangladesh” or “Belize” or “Benin” or “Bhutan” or “Bolivia” or “Bosnia” or “Botswana” or “Brazil” or “Bulgaria” or “Burkina Faso” or “Burundi” or “Cambodia” or “Cameroon” or “Cape Verde” or “Caribbean” or “Central Africa” or “Central African Republic” or “Central America” or “Central Asia” or “Chad” or “Chile” or “China” or “Colombia” or “Comoros” or “Congo” or “Costa Rica” or “Côte d'Ivoire” or “Cuba” or “Developing countr*” or “Developing world” or “Djibouti” or “Dominica” or “Dominican Republic” or “East Africa” or “East Asia” or “Ecuador” or “Egypt” or “El Salvador ” or “Eritrea” or “Ethiopia” or “Fiji” or “Francophone Africa” or “Gabon” or “Gambia” or “Gaza” or “Georgia” or “Ghana” or “Grenada” or “Guatemala” or “Guinea-Bissau” or “Guinea” or “Guyana” or “Haiti” or “Herzegovina” or “Himalayas” or “Honduras” or “Horn of Africa” or “India” or “Indonesia” or “Iran” or “Iraq” or “Jamaica” or “Jordan” or “Kazakhstan” or “Kenya” or “Kiribati” or “Korea” or “Kosovo” or “Kyrgyz” or “LAMIC” “Lao” or “Latin America” or “Latvia” or “Lebanon” or “Lesotho” or “Less developed countr*” or “Liberia” or “Libya” or “Lithuania” or “Low and middle income countr*” or “Low income countr*” or “Lusophone Africa” or “Macedonia” or “Madagascar” or “Malawi” or “Malaysia” or “Maldives” or “Mali” or “Marshall Islands” or “Mauritania” or “Mauritius” or “Mayotte” or “Mexico” or “Micronesia” or “Middle income countr*” or “Moldova” or “Mongolia” or “Montenegro” or “Morocco” or “Mozambique” or “Myanmar” or “Namibia” or “Nepal” or “Nicaragua” or “Niger” or “Nigeria” or “North Africa” or “Northeast Asia” or “Pakistan” or “Palau” or “Panama” or “Papua New Guinea” or “Paraguay” or “Peru” or “Philippines” or “Poor countr*” or “Poor region*” or “Romania” or “Russia” or “Russian Federation” or “Rwanda” or “Sahara” or “Sahel” or “Samoa” or “São Tomé and Principe” or “Senegal” or “Serbia” or “Seychelles” or “Sierra Leone” or “Solomon Islands” or “Somalia” or “South Africa” or “South America” or “South Asia” or “Southeast Asia” or “Southern Africa” or “Sri Lanka” or “St. Kitts and Nevis” or “St. Lucia” or “St. Vincent and the Grenadines” or “Sub-Saharan Africa” or “Sudan” or “Suriname” or “Swaziland” or “Syria” or “Syrian Arab Republic” or “Tajikistan” or “Tanzania” or “Thailand” or “Timor-Leste” or “Togo” or “Tonga” or “Tunisia” or “Turkey” or “Turkmenistan” or “Tuvalu” or “Uganda” or “Ukraine” or “Under-developed countr*” or “Uruguay” or “Uzbekistan” or “Vanuatu” or “Venezuela” or “Vietnam” or “West Africa” or “West Bank” or “Yemen” or “Zambia” or “Zimbabwe”

3.3.2 Searching other resources

To capture gray literature, we searched websites of nongovernmental and inter-governmental agencies, think tanks, and international research centers. Agency websites searched for gray literature included those of United Nations agencies, international development banks, and aid groups; nongovernmental organizations (NGOs) and foundations; and international research institutes and centers of expertise. We also worked with our international advisory panel and members’ networks to identify relevant literature, and we reached out directly to our colleagues in the field.

3.4 Data Collection and Analysis

3.4.1 Selection of studies

Studies had to meet the following criteria to move on to the next stage of the review:

- Published in 2003 or later;
- Included a test of an intervention;
- Addressed the topic of literacy (defined broadly);
- Included children ages 3 to 12 years, or "primary school–age" children (overlap with other age groups was acceptable, as long as children in the target range were also included);
- Included a comparison or control group drawn from the same population as the treatment group; and
- Took place in an LMIC (according to 2012 World Bank categories).

Title and abstract screening was carried out by a team of researchers and research assistants. Studies identified for retrieval were reviewed by qualified researchers (master's degree or higher in a relevant field, with expertise in research methods). Some team members had been involved in carrying out or reporting on some of the studies slated for review. In those cases, the studies were assigned to reviewers from an organization that had not been involved in carrying out the research. In cases where the two reviewers did not initially agree regarding whether a study met the inclusion criteria, those reviewers then discussed the study and in all cases consensus was easily reached.

The studies were reviewed to determine whether they met the following criteria:

- The intervention included parents, families, or community members. Interventions that took place in schools were acceptable as long as there was involvement of parents, families, or community members (including peers). Interventions that were *solely* delivered by a teacher, other school staff, or researcher were excluded.
- The intervention group had a valid comparison group.
- There were one or more valid outcome measures that assessed literacy or preliteracy skills (such as reading, vocabulary, writing, letter recognition, decoding skills, or print awareness). These measures could include standardized assessments, academic tests or scores, or researcher-developed instruments (as long as they were not over-aligned with the intervention).
- The report contained adequate information about the evaluation to assess the above. For example, several documents were removed from consideration because they were short summaries describing programming and did not include the kind of information required for the current review (such as a description of how the control group was formed).

In the protocol for this review, we indicated that we would exclude quasi-experimental studies that reported pre-test differences on measures of literacy or preliteracy. All four studies of the OSI program, *Getting ready for school*, reported evidence of pre-existing differences between the treatment and control groups (greater than 0.25 standard deviations). Instead of excluding these studies from the review, effect sizes were computed and reported for the studies while noting that the overall effect size may be biased.

We also excluded studies that addressed the topic of educational radio, because a systematic review of the impact of educational radio was recently completed (Ho & Thukral, 2009). Therefore, we felt it was appropriate to reference but not duplicate the existing review.

3.4.2 Data extraction and management

Mendeley software was used to manage citations, abstracts, and documents. Citations were exported to active Excel worksheets for title and abstract screening. Two researchers then independently reviewed each article to ensure that it met the criteria for inclusion, noting the study characteristics in an active Excel worksheet. Studies that had been carried out by researchers involved in this review were identified for screening and reviewed by researchers who were entirely independent of the study.

Data extracted included:

- Information about the study setting (which country, urban or rural region, etc.);
- Group formation process (how treatment and comparison groups were formed, any concerns about comparability of non-randomized comparison group);
- Independence of the evaluation;
- Outcome measures (what they are, any issues of over-alignment, etc.);
- Attrition;
- For quasi-experimental designs, whether adequate information was provided to assess baseline equivalence, and whether there were any concerns about baseline equivalence;
- Descriptions of the intervention and comparison conditions;
- Characteristics of the participants and the implementers; and
- Statistics required for meta-analysis (where available)

For the 13 studies that met the criteria for inclusion in this review, data were extracted for inclusion in meta-analyses (where possible) and placed in an Excel worksheet. In one case, a study's author was contacted directly to request needed data for computing effect sizes that were not included in the article. Meta-analyses were carried out with Comprehensive Meta-Analysis (CMA) software.

3.4.3 Assessment of risk of bias in included studies

The following aspects of the eligible studies were coded and used as indicators of study quality: (a) formation of the control group, (b) information about attrition, and (c) baseline equivalence. For each study, the procedure for forming the control group was noted. These categories included random assignment, wait-list control, and pre-existing group. The number of participants that were missing from any of the outcome assessments from the treatment and control groups was also recorded for each study. For baseline equivalence, information was recorded for any included pre-tests including the summary statistics for reported baseline measures, the value of any statistical test of these baseline measures, and the results of those statistical tests. If no statistical tests were reported, a description of the difference between the baseline measures as discussed in the study was reported.

In addition, information about any difficulties in the evaluation of the interventions was recorded. The evaluation reports for the UNICEF Child-to-Child studies included descriptions of data collection problems that could have led to potential bias in the reporting of outcomes of the intervention.

3.4.4 Measures of treatment effects

The standardized mean effect size was used as the measure of treatment effect given that the outcome measures were all measured on a continuous scale. The standardized mean effect size for a nonclustered, experimental study is given by Hedges (1981) as

$$d = \frac{\bar{X}_E - \bar{X}_C}{s_p}, \quad (1)$$

where $\bar{X}_E$ and $\bar{X}_C$ are the experimental and control group means, respectively, and s_p^2 is the pooled sample standard deviation given by

$$s_p = \sqrt{\frac{(n_E - 1)s_E^2 + (n_C - 1)s_C^2}{(n_E - 1) + (n_C - 1)}} \quad (1)$$

where s_E^2 and s_C^2 are the experimental and control group standard deviations, respectively. The experimental and control group sample sizes are given by n_E and n_C. Effect sizes were also corrected for small sample bias using Hedges' (1981) correction.

3.4.5 Unit of analysis issues

Several of the studies were cluster randomized or quasi-experimental trials, where the level of assignment was at the school or district level. For these studies, effect sizes were computed using Hedges' (2007) d_{T2} effect size assuming equal cluster sample sizes. The effect size is given by

$$d_{T2} = \left(\frac{\bar{X}^E_{\square} - \bar{X}^C_{\square}}{S_T} \right) \sqrt{1 - \frac{2(n-1)\rho}{N-2}}. \quad (1)$$

The overall means for the experimental and control groups (averaged across clusters and groups) are given by $\bar{X}^E_{\square}$ and $\bar{X}^C_{\square}$. The total sample standard deviation is given by S_T, estimated from the pooled sample standard deviation across both experimental and control groups. The intraclass correlation is ρ. The total sample size for the trial is *N,* and the cluster sample sizes are given by *n.* We assumed equal cluster sizes; when the cluster sample sizes were not equal, we used the smallest cluster sample size in the computations. The effect sizes for unequal cluster sample sizes require the actual sample sizes for each cluster in a trial; the studies in our sample reported the cluster sizes on average across the experimental and control groups. Hedges (2007) indicates that the effect sizes computed for equal cluster sizes are not substantially different from those assuming unequal cluster sizes and can be used in place of the more complex formulas for unequal cluster sizes. The variance of the effect size d_{T2} is given by

$$V\{d_{T2}\} = \left(\frac{N^E + N^C}{N^E N^C}\right)(1+(n-1)\rho) + d_{T2}^2\left(\frac{(N-2)(1-\rho)^2 + n(N-2n)\rho^2 + 2(N-2n)\rho(1-\rho)}{2(N-2)\left[(N-2)-2(n-1)\rho\right]}\right) \quad (1)$$

where N^E and N^C are the experimental and control group sample sizes summed across clusters. For the clustered randomized trials that were included in the meta-analysis, the original analysis was available. The intraclass correlation was computed from the original data for these studies to obtain the effect size.

3.4.6 Dealing with missing data

As indicated above, the intraclass correlation coefficient was required for the computation of effect sizes from clustered trials. For UNICEF's *Getting Ready for School: A Child-to-Child Approach* studies and for the Open Society Institute *Getting Ready for School* program, the study authors were contacted to provide the intraclass correlation coefficient. Authors of the educational television studies and the *Read India* study were also contacted for information needed to compute effect sizes. The authors of the *Read India* study did provide more information, but summary statistics needed to compute the clustered effect sizes were unavailable. The authors of the educational television studies did not respond to requests for data, so additional analyses could not be conducted for those studies.

3.4.7 Assessment of heterogeneity

For studies that are included in a meta-analysis, heterogeneity was assessed using both I^2 and the test of the statistical significance of the random variance component, τ^2. Given the small numbers of studies included in the meta-analysis, we did not conduct moderator analyses.

3.4.8 Assessment of reporting biases

The studies were examined for evidence of reporting biases. For the UNICEF and Open Society Institute studies, we obtained complete reports of the studies and their protocols. We found no evidence of reporting biases in the remaining reports used in the meta-analysis. As mentioned above, the studies on educational television and the *Read India* reports did not provide enough information to compute an effect size.

3.4.9 Data synthesis

A random effects model was used for the synthesis of the studies. We chose a random effects model because the context and implementation of the trials differed across studies. In a random effects model, the variance of the effect sizes is given by

$$Var(d) = \sqrt{\frac{N^E + N^C}{N^E N^C} + \frac{d^2}{2(N^E + N^C)}} + \tau^2 \quad (1)$$

where τ^2 is the random effects variance component. The random effects variance component was computed using the method of moments through the program *Comprehensive Meta-analysis 2.2.064* (Biostat, 2011). We planned to analyze studies with high risk of bias (high attrition rates or non-equivalent baselines) separately from studies with low risk of bias. We also planned to conduct separate meta-analyses for each outcome measure included in the studies to guard against dependency issues. In addition, we planned to analyze outcomes by follow-up year, separately analyzing year 1 follow-up from year 2 follow-up results. As will be seen in the results, we synthesized the results from two sets of programs, child-to-child peer tutoring, and parent education programs. A separate meta-analysis was conducted for the immediate posttest and for the follow-up posttest for each conceptually similar outcome. For example, the child-to-child peer tutoring studies each measured the following for the immediate posttest: Reading total, and Subtests for Beginning Reading, Letter Identification, Writing. For the follow-up, Year 2 outcomes, each study measured Reading, Writing and Overall Literacy. The parent education studies collected measures of overall literacy immediately after the treatment and then in Year 2. A separate meta-analysis was conducted for each outcome and time point (immediate posttest and follow-up).

3.4.10 Subgroup analysis and investigation of heterogeneity

We conducted two separate meta-analyses, one for programs based on child-to-child peer tutoring and one based on parent education programs. For each meta-analysis, there was an insufficient number of studies to conduct subgroup analyses or moderator analyses.

3.4.11 Sensitivity analysis

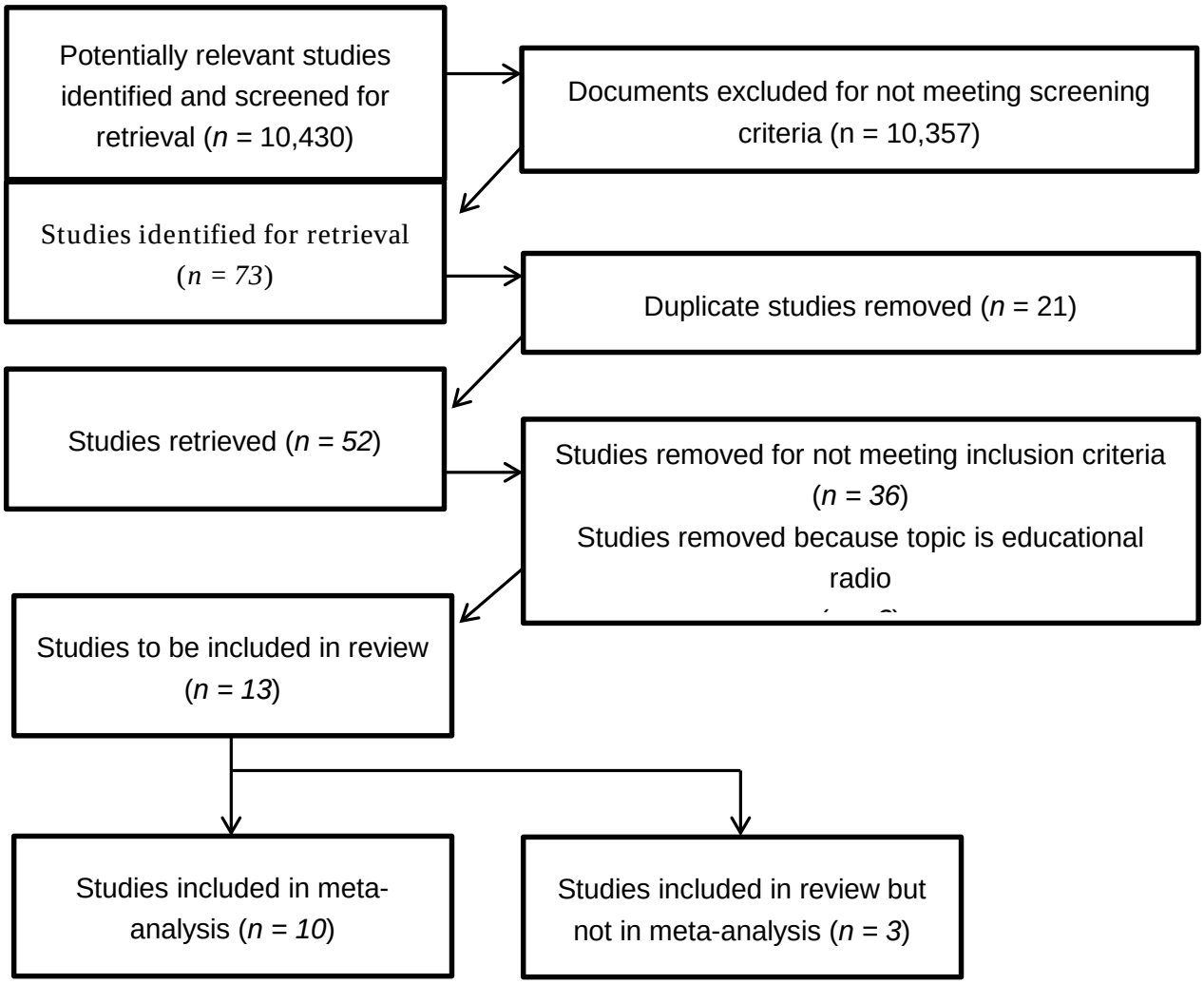
None of the effect sizes were outlying observations, so there was no need to examine the impact of effect sizes that would have been considered outliers.

4. Results

4.1 Results of the Search

Title and abstract screening resulted in the elimination of 10,357 studies that failed to meet one or more of the preceding criteria, leaving 73 studies identified for retrieval. After 21 duplicate citations were removed, we retrieved the remaining 52 studies. We then eliminated 3 studies for addressing the topic of educational radio, and 36 for one or more of the reasons listed above in Section 3.4.1. This left us with the 13 studies that were ultimately included in the review. See Figure 2.

Figure 2: Study Selection Process



The list of included studies is shown in Table 3.

Table 3: Included Studies

Study	Type of Intervention	Name of Intervention	Country
Borzekowski & Henry (2011)	Television	Jalan Sesama	Indonesia
Baydar, Kağitçibaşi, Küntay, & Gökşen (2008)	Television	Will You Play With Me?	Turkey
Büyüktaşkapu (2012)	Parent Instruction	Family-Supported Pre-Reading Program	Turkey
American Institutes for Research (2012a)	Parent Instruction	OSI's Getting Ready for School	Armenia
American Institutes for Research (2012b)	Parent Instruction	OSI's Getting Ready for School	Bosnia and Herzegovina
American Institutes for Research (2012c)	Parent Instruction	OSI's Getting Ready for School	Kazakhstan
American Institutes for Research (2012d)	Parent Instruction	OSI's Getting Ready for School	Tajikistan
Banerjee, Banerji, Duflo, Glennerster, & Khemani (2008)	Tutoring	READ India	India
UNICEF (2013)	Tutoring	Getting Ready for School: A Child-to-Child Approach	Bangladesh DR Congo Ethiopia Tajikistan Yemen

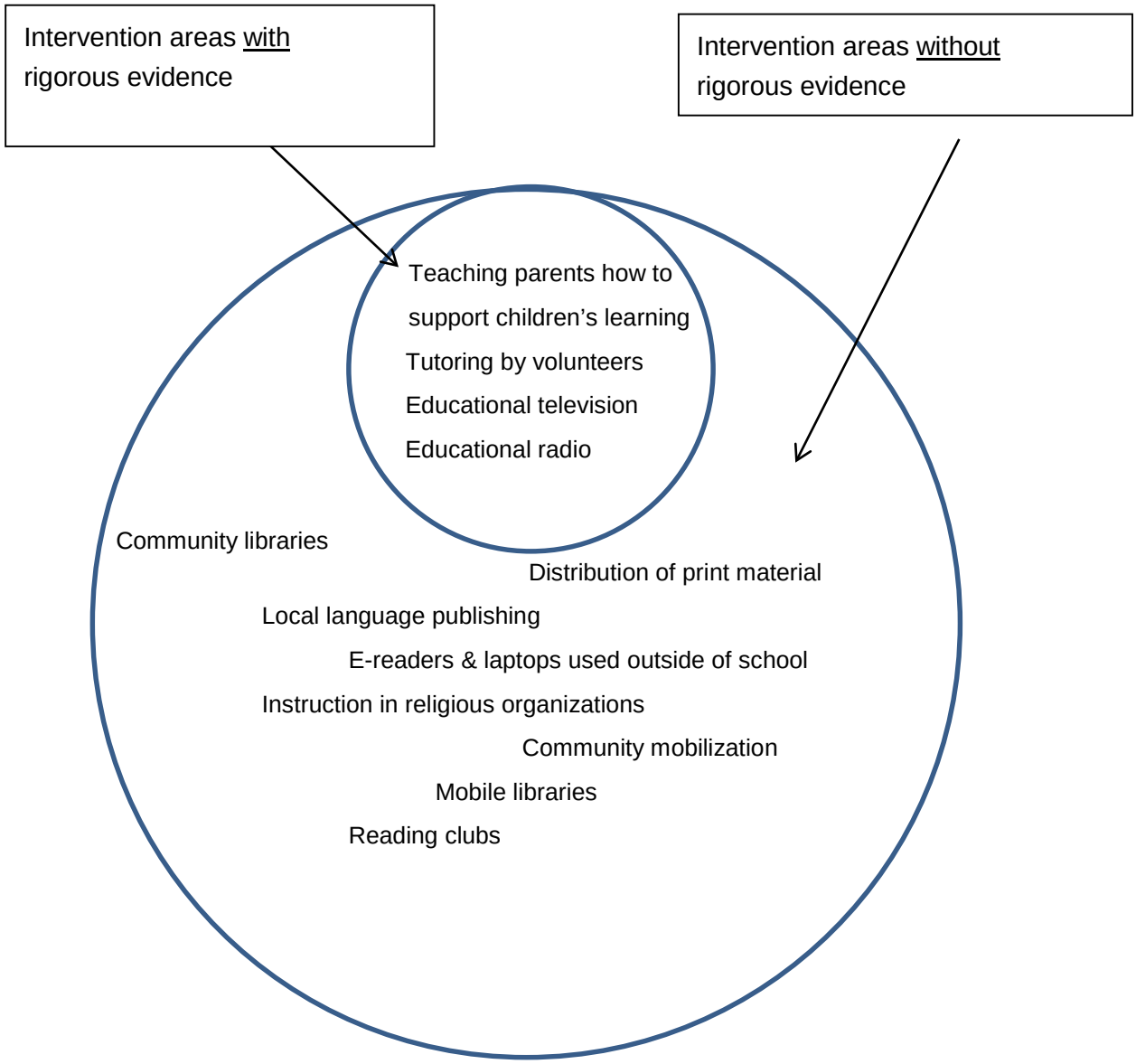
The results of our search are very illuminating in their own right. We found that there are many types of interventions occurring in LMICs that are intended to improve children's literacy outcomes take place outside of the formal education system.

The interventions that *did* have evidence of their effectiveness were:

1. Educational television;
2. Educational radio;
3. Programs that show parents how to support their children's school readiness (including in the area of literacy); and
4. Programs that use a tutoring approach, with peers or adult community members teaching children literacy skills.

A large number of intervention approaches in use globally by both NGOs and government organizations did *not* appear to have empirical evidence for (or against) their effectiveness in improving children's literacy. Many of these interventions are widely used in LMICs, such as the provision of libraries (standing or mobile) in many countries such as Zimbabwe, Kenya, India and Venezuela; local-language publishing in countries such as Cambodia, Sri Lanka, and Zambia; the teaching of literacy through religious instruction, such as in madrasas around the world; and the distribution e-readers in countries such as Ghana and Uganda. This issue is illustrated in Figure 3.

Figure 3: Areas With and Without Rigorous Evidence



4.2 Description of Studies

4.2.1 Topic areas of studies identified

The studies that fit our criteria for inclusion in this review were:

- Two studies of educational television used outside of schools;
- Five studies that tested the effectiveness of programs designed to improve parents' support for their children's school readiness (including in the area of literacy); and
- Six studies that assessed the effectiveness of tutoring interventions intended to improve children's literacy; five using peer-assisted learning, and one using adult community members.

Two of the interventions have similar names (the *Getting Ready for School* program, operated by the Open Society Institute, and *Getting Ready for School: A Child-to-Child Approach*, operated by UNICEF). These are distinct interventions.

The results of UNICEF's *Getting Ready for School: A Child-to-Child Approach* initiative were published in a single report that includes results for five countries (2013). Different data collection teams conducted the studies using different sampling approaches across the five countries; thus, each country's results are treated as a separate study for this review.

4.2.2 Locations of studies identified

The studies identified for inclusion in this review cover a variety of LMICs:

- Armenia
- Bangladesh
- Bosnia and Herzegovina
- Democratic Republic of Congo
- Ethiopia
- India
- Indonesia
- Kazakhstan
- Tajikistan
- Turkey
- Yemen

Two studies were conducted in Tajikistan, two in Turkey, and one in each of the other countries listed above. The list contains low-income countries (Bangladesh, Democratic Republic of Congo, Ethiopia, and Tajikistan), lower-middle-income countries (Armenia, India, Indonesia, and Yemen) and upper-middle-income countries (Bosnia and Herzegovina, Kazakhstan, and Turkey).

Latin American countries are noticeably absent from this list, despite our efforts to access both academic and gray literature in English and Spanish. Studies from Latin America were identified in the initial search, but none met our criteria for inclusion in this review.

4.2.3 Description of the interventions

The 13 studies identified for this review covered six different interventions: *Jalan Sesama* and *Will You Play With Me?* in the area of educational television; the *Family Supported Pre-Reading Program* and *Open Society Institute (OSI*) *Getting Ready for School* in the area of parent support programs; and *UNICEF's Getting Ready for School: A Child-to-Child Approach* and *Read India* in the area of tutoring.

Jalan Sesama

Jalan Sesama is a version of *Sesame Street* that was created to support the developmental needs of children in Indonesia. In many Indonesian communities, children and their families face significant challenges that can negatively impact educational attainment, such as economic hardship, natural disasters, and civil unrest. This intervention is based on evidence from other contexts that educational television can have a positive effect on children's learning (including literacy) and social development (Mares & Pan, 2013). *Jalan Sesama* is available to the public on Indonesian television. The program consists of 52 weekly episodes and addresses early cognitive skills, literacy, mathematics, health, safety, social development, environmental awareness, and cultural awareness. However, not all communities have access to television.

The intervention reviewed here involved children viewing DVD recordings of *Jalan Sesama* at a local school (outside of the normal school day). Teachers did not provide any additional support or instruction to the children. A high-exposure group viewed three or four *Jalan Sesama* episodes per week over 14 weeks (they saw each of the 52 episodes once). A low-exposure group viewed one episode of *Jalan Sesama* per week over 14 weeks (the same first 14 episodes viewed by the high-exposure group).

Will You Play With Me?

Will You Play With Me? (Benimle Oynar Mısın?) is a Turkish educational television program developed by the Mother-Child Education Foundation. The goal of this program is to improve school readiness among Turkish children; it targeted children ages 4 to 6 years from lower socio-economic backgrounds who lacked access to preprimary education. The program is similar to *Sesame Street*, but with additional components intended to involve parents in their children's learning. Its topic areas include cognitive development, family relationships, social and emotional development, health, and environmental awareness. The program consists of 65 half-hour segments that are aired twice per day on Turkish television.

The intervention reviewed here involved asking parents of children ages 4 to 7 years to have their children watch *Will You Play With Me?* on television in their home every weekday for 13 weeks, starting with the first program of the series (so they watched all 65 episodes by the end of the 13 weeks).

Family Supported Pre-Reading Program

The *Family Supported Pre-Reading Program* was developed by researchers at Mevlana University in Turkey. The program was developed for use with children age 6 who attend preprimary education programs and was intended to build children's literacy skills by teaching parents how to become active partners in supporting their children's literacy development. The logic model for this intervention states that parental support for children's development (in addition to formal preprimary education) can provide children with more school readiness in the area of literacy than they would get from formal preprimary education alone. The *Family Supported Pre-Reading Program* is specific to Turkey (not currently offered in other countries).

For the study reviewed here, parents attended weekly meetings for 13 weeks. Each week they were given 18 specific activities to do with their children to promote literacy (phonological awareness, letter recognition, storytelling, reading concepts, and chronology). Parents then carried out these activities with their children at home between sessions, using 13 workbooks provided by the program.

OSI's Getting Ready for School

OSI is a non-governmental organization dedicated to promoting a range of educational initiatives. OSI's *Getting Ready for School* program was developed in partnership with the International Step-by-Step Association for use in disadvantaged communities in Eurasia where preprimary education was unavailable to most children. The program was designed for contexts where parents had at least a basic educational level (i.e., basic literacy). The goal of the intervention is to improve children's school readiness across domains (including literacy) and teach parents how to become active partners in supporting their children's education. The logic model for this intervention states that, where preprimary education is unavailable, parents or other adult family members (such as grandparents) can be taught how to develop children's school-readiness skills. This program is currently in use in multiple countries in Eastern Europe and Central Asia.

For the study reviewed here, parent educators were trained to provide guidance and supervision to parents of children who were 1 year away from expected on-time Grade 1 entry at the start of the program. The trainers met with parents in a group for nine monthly sessions that were typically held at a school (outside of regular school hours). During the sessions, parents were provided with information about child development and how to support children's learning, and were taught how to do specific activities with their children to promote academic learning, cognitive skills, and social and behavioral skills. Parents then carried out these activities with their children at home between sessions. These activities were designed to support child development through play, addressing literacy (such as vocabulary, letter recognition, sight reading, storytelling, and beginning writing) as well as mathematics and other areas of development. For example, for one activity, parents were shown how to create a board game with their child for use at home. This activity was intended to build parent-child collaboration, plus build children's skills in areas such as counting, taking turns, and following instructions.

UNICEF's Getting Ready for School: A Child-to-Child Approach

UNICEF's *Getting Ready for School: A Child-to-Child Approach* was developed in collaboration with the Child-to-Child Trust for use in disadvantaged communities where preprimary education is unavailable to most children (and where parents may not be able to support their children's learning well because of their own lack of education). The program was designed to be appropriate across cultural contexts. The goal of the intervention is to improve children's school readiness across domains (including literacy), and increase on-time enrollment in primary school. The logic model for this intervention states that young children are influenced by older children (siblings, playmates) in their homes and communities. By teaching older children how to support younger children's learning, and providing a structured way for them to do so, the younger children will develop better school readiness. And when young children become enthusiastic about learning and are well prepared to succeed in primary school, parents are more likely to enroll them on time and keep them enrolled. This program is currently in use across multiple countries in Sub-Saharan Africa, the Middle East, Central Asia, Southeast Asia, and South America.

For the study reviewed here, teachers were trained to provide guidance and supervision to students in Grades 4–8 who acted as "Young Facilitators." The Young Facilitators were matched with two or more young children in the community who were one year away from on-time Grade 1 enrollment. Young Facilitators and young children met for 35 sessions that were typically held twice weekly at a school (outside of regular school hours). In some

countries, Young Facilitators and young children also met in the community for additional sessions. Young Facilitators worked through a series of planned activities with the young children. These activities were designed to support child development through play; they addressed literacy, mathematics, cognitive skills, and social and behavioral skills.

Read India

Read India is a widely used intervention developed and implemented by the Pratham Mumbai Education Initiative. It is available in just over half of all villages in India. *Read India* is based on a logic model that says that engaging individual community members can help improve children's learning outcomes, even in the absence of the involvement of the formal education system or wider community, and that community ownership is the key to achieving change. The goals of the program are to ensure that all children in Standard 1 know their letters and numbers, all children in Standard 2 can read words and perform simple arithmetic, and that all children in Standards 3 to 5 can read simple texts fluently and solve mathematical problems.

The program evaluated here involved training local volunteers to provide literacy education through "camps" held outside of school hours. The villages involved in the evaluation were located in a state with poor basic literacy achievement. Villages had as many as 16 literacy camps, staffed by different volunteers. The classes were open to children in the villages assigned to the treatment condition, but specific children were *not* targeted for participation or assigned to receive the program. Across all participating villages, approximately 8 percent of the children participated in programming.

4.2.4 Description of the included studies

The included studies employed randomized controlled trials (RCTs) and quasi-experimental designs to evaluate the impacts of the interventions. In this section, the study design is presented for each intervention described above. Some interventions were studied in multiple countries with multiple evaluation designs. In such cases, the design for each separate study is specified (Table 4). See Tables 15 through 27 (Appendix) for additional details for each study, including specific location(s), formation of treatment and control groups, participant characteristics, the treatment and comparison conditions, outcomes assessed, and attrition.

Table 4: Summary of Included Studies

Intervention	Location	Design	Approach
Jalan Sesama	Indonesia	RCT	Educational television
Will You Play With Me?	Turkey	RCT	Educational television
Family Supported Pre-Reading	Turkey	QED	Parent instruction
OSI's Getting Ready for School	Armenia	RCT	Parent instruction

Intervention	Location	Design	Approach
OSI's Getting Ready for School	Bosnia-Herzegovina	QED	Parent instruction
OSI's Getting Ready for School	Kazakhstan	QED	Parent instruction
OSI's Getting Ready for School	Tajikistan	QED	Parent instruction
UNICEF Child-to-Child	Bangladesh	RCT	Peer tutoring
UNICEF Child-to-Child	Democratic Republic of Congo	QED	Peer tutoring
UNICEF Child-to-Child	Ethiopia	QED	Peer tutoring
UNICEF Child-to-Child	Tajikistan	RCT	Peer tutoring
UNICEF Child-to-Child	Yemen	RCT	Peer tutoring
Read India	India	RCT	Peer tutoring

Jalan Sesama

The evaluation of *Jalan Sesama* was conducted with a single RCT conducted in Indonesia. Children ages 3.5 to 6 years in low-income communities were randomly assigned to high exposure to an educational television program, low-exposure, or a no-exposure control group that watched a non-educational television program. Outcomes assessed included letter recognition, phonemic awareness, and writing. There was zero attrition. See Table 15 (Appendix) for more information regarding this study.

Will You Play With Me?

The evaluation of *Will You Play With Me?* was assessed with a single RCT conducted in the largest metropolitan area of Turkey. Children aged 5 years, 3 months on average were randomly assigned to an intervention group (watched the program regularly), control group (did not watch the program), or a natural observation group (parents were informed about the program and were free to have their children watch or not watch it). Outcomes assessed included syllabification and vocabulary. There was 5 percent attrition in the intervention group, 9 percent in the control group, and 29 percent in the natural observation group. See Table 16 (Appendix) for more information regarding this study.

Family Supported Pre-Reading Program

The evaluation of the *Family Supported Pre-Reading Program* was a small quasi-experimental study carried out with families whose children attended a preschool program in Konya, Turkey. The comparison group was made up of children who had attended another preschool in Konya during the same time period (it was unclear whether the comparison children were drawn from one other preschool or multiple preschools). Demographic

information (such as child age or family socio-economic status) was not available. Outcomes assessed included reading comprehension, mechanical reading skills, and writing. There was zero attrition. See Table 17 (Appendix) for more information regarding this study.

OSI's Getting Ready for School

Four separate evaluations were carried out to assess the effects of OSI's *Getting Ready for School* intervention—one each in Armenia, Bosnia and Herzegovina, Kazakhstan, and Tajikistan. All were carried out in communities where children lacked access to preprimary education. The program was provided to children one year before on-time Grade 1 enrollment. In the treatment condition, families participated in nine monthly sessions where they were instructed how to support their children's school readiness.

The study in Armenia was an RCT. Communities across five provinces were randomly assigned to the treatment (program) or control (no program) group. Nearly all children were age 5 at baseline. At outcome, children were assessed in the areas of letter identification, phonics, print concepts, reading, and writing. At the end of Grade 1, children were assessed in the areas of phonics, reading comprehension, rhyming, writing, and teacher ratings for overall literacy development. By the end of the study (end of Grade 1), 7 percent of the intervention group and 11 percent of the control group had been lost to attrition. See Table 18 (Appendix) for more information regarding the study in Armenia.

The study in Bosnia and Herzegovina consisted of a quasi-experimental design, with four communities identified for the intervention, then four similar communities identified to serve as a no-treatment comparison group. Children averaged age 5 at baseline. At outcome, children were assessed in the areas of letter identification, phonics, print concepts, reading, and writing. At the end of Grade 1, children were assessed using teacher ratings for overall literacy development. By the end of Grade 1, 26 percent of the intervention group and 18 percent of the control group had been lost to attrition. See Table 19 (Appendix) for information regarding this program evaluation in Bosnia and Herzegovina.

In Kazakhstan, four communities were first selected for the intervention, and then four similar communities were identified to serve as a no-treatment comparison group. Then individual children in the comparison group communities were identified based on a demographic match with individual children in the intervention group communities. Children in both groups averaged 5.5 years old at baseline. At outcome, children were assessed in the areas of letter identification, phonics, print concepts, reading, and writing. At the end of Grade 1, children were assessed using teacher ratings for overall literacy development. By the end of Grade 1, 5 percent of the intervention group and 3 percent of the control group had been lost to attrition. See Table 20 (Appendix) for more information regarding the program evaluation in Kazakhstan.

In Tajikistan, four communities were first selected for the intervention, and then four similar communities were identified to serve as a no-treatment comparison group. Then individual children in the comparison group communities were identified based on a demographic match with individual children in the intervention group communities. Children in both groups averaged 6.5 years old at baseline. At outcome, children were assessed in the areas of letter identification, phonics, print concepts, reading, and writing. At the end of Grade 1, children were assessed using teacher ratings for overall literacy development. By the end of Grade 1, 4 percent of the intervention group and 5 percent of the control group had been lost to attrition. See Table 21 for more information regarding this program evaluation in Tajikistan.

UNICEF's Getting Ready for School: A Child-to-Child Approach

Five separate evaluations were carried out to assess the effects of UNICEF's *Getting Ready for School: A Child-to-Child Approach* intervention—one each in Bangladesh, Democratic Republic of Congo, Ethiopia, Yemen, and Tajikistan. All were carried out in communities where children lacked access to preprimary education. In all countries except Tajikistan, parents typically had a low level of education, and on-time enrollment of children in primary school was low in the participating communities. The program was provided to children one year before on-time Grade 1 enrollment. The program consisted of peer tutoring sessions where older students were trained by teachers to support young children's school readiness across a range of academic areas. The older and younger children met together in the school approximately weekly during the school year, and met for additional sessions in the community in all countries except Tajikistan.

The study of UNICEF's *Getting Ready for School: A Child-to-Child Approach* in Bangladesh was an RCT. One district and two upazilas (subdistricts) from the district within each of the six administrative divisions of the country were selected based on high drop-out and low primary school completion rates. Then the pair of upazilas within each district was randomly assigned, with one each in the intervention group and the control group. Then five schools from each upazila in each group were randomly selected to participate in the program (if in the intervention group) and the evaluation. Children's ages were not available (birth registration is not universal in Bangladesh, and many parents do not know their child's date of birth). Outcomes assessed at the conclusion of the program included letter identification, reading, and writing. Teachers were also asked to assess children's literacy development at and of grade one. At the first outcome assessment (end of program year), attrition was 12 percent in the intervention group and 11 percent in the control group. Grade 1 outcome data was unavailable for 47 percent of the intervention group and 5 percent of the control group (these figures includes children who had not yet enrolled in Grade 1 so they had no teachers to survey). See Table 22 (Appendix) for more information about this study in Bangladesh.

The study of UNICEF's *Getting Ready for School: A Child-to-Child Approach* in the Democratic Republic of Congo consisted of a quasi-experimental design. Fifteen schools in Kinshasa and 10 in Mbandaka were identified for the intervention. Then 15 matched schools in Kinshasa and 10 in Mbandaka were identified to serve as the control group. Children averaged age 5 at baseline. Outcomes assessed included letter identification, reading and writing. There were significant difficulties with data collection caused by impassable roads and incursions of the civil conflict, resulting in missing data from Mbandaka. After one year, follow-up data was available for only 38 percent of the intervention group and 35 percent of the control group. See Table 23 (Appendix) for more information about this study in the Democratic Republic of Congo.

The study of UNICEF's *Getting Ready for School: A Child-to-Child Approach* in Ethiopia consisted of a quasi-experimental design. A total of 20 schools from Harar, Oromia, and Tigray were identified for the intervention. Then 20 matched schools from the same school clusters as the intervention schools were identified to serve as the control group. Children averaged age 6 at baseline. Outcomes assessed included letter identification, reading and writing.This study had many issues with missing data, and attrition was very high (56 percent for intervention group and 30 percent for control group). See Table 24 (Appendix) for more information about the study in Ethiopia.

The study of UNICEF's *Getting Ready for School: A Child-to-Child Approach* in Tajikistan consisted of an RCT. Forty schools took part in the evaluation: 20 from Rumi and 20 from Bokhtar. Within each region, half of the schools were randomly assigned to the intervention group and half to the control group. Children averaged age 7 at baseline. Outcomes assessed at the conclusion of the program included letter identification, reading, and writing. Teachers were also asked to assess children's literacy development at the end of Grade 1. At the first outcome assessment (end of program year), attrition was less than 1 percent in the intervention group and less than 1 percent in the control group. At the end of Grade 1, attrition was 9 percent in the intervention group and 8 percent in the control group. See Table 25 (Appendix) for more information about this study in Tajikistan.

The study of UNICEF's *Getting Ready for School: A Child-to-Child Approach* in Yemen was an RCT. Thirty schools in the Taiz governorate took part in the evaluation, with 10 each from Haifan, Al-Makha, and Mawza. Within each of the three regions, half of the schools were randomly assigned to the intervention group and half to the control group. Children averaged just under 6 years of age at baseline. Outcomes assessed at the conclusion of the program included letter identification, reading, and writing. Teachers were also asked to assess children's literacy development at the end of Grade 1. At the first outcome assessment (end of program year), attrition was 12 percent in the intervention group and 15 percent in the control group. At the time of the Grade 1 assessment, 19 percent of the intervention group and 38 percent of the control group did not have teacher surveys available. These figures reflect the fact that not all children enrolled in Grade 1 (especially in the control group). See Table 26 (Appendix) for more information about this study in Yemen.

Read India

The evaluation of *Read India* was a large RCT carried out in Jaunpur District, in the state of Uttar Pradesh, India. From a pool of 280 villages that participated in a baseline assessment, 65 were randomly assigned to the intervention group, and 85 to a control group (the remaining participated in other initiatives not part of the current review). In the intervention group villages, *Read India* program was made available to children ages 7 to 14 from those villages. The control group villages did not have *Read India* programming available. Outcomes assessed included letter recognition, single word reading, and text reading. The reported study sample only included children who participated in both the pretest and the posttest. Original sample size is not available for the group of children involved in this specific intervention. See Table 27 (Appendix) for more information about this study.

4.3 Risk of Bias in Included Studies

4.3.1 Interventions to help parents support their children's school readiness

Certain limitations of the studies included in this analysis pose potential risks of bias to the results. For the evaluation of OSI's *Getting Ready for School* initiative, the studies conducted in Armenia, Kazakhstan, and Tajikistan had substantial imbalance in children's literacy scores at baseline, with treatment children outperforming comparison children by 0.31–0.50 standard deviations across the three countries, which was above our planned cut point and may have biased the impact findings even with adjustment for baseline covariates. It is also worth noting that in the Tajikistan study, the effect size for the second-year impact on children's literacy skills was unusually large for educational interventions (1.74), which is particularly perplexing, given that the intervention had a substantial negative impact in the first year (effect size = -0.32). Therefore, findings from the Tajikistan study, particularly the

second-year findings, may have biased the results of the meta-analysis. No significant risks of bias were evident in the study of OSI's *Getting Ready for School* initiative in Bosnia and Herzegovina, nor in the study of the *Family Supported Pre-Reading Program*.

4.3.2 Tutoring interventions

The studies included in this analysis each had a number of potential risks of bias to the results. All studies on UNICEF's *Getting Ready for School: A Child-to-Child Approach* were included in a single report and included information about difficulties in collecting data. For example, in the Democratic Republic of Congo, flooding and conflict incursions hindered data collection in almost half of the matched pairs of schools, resulting in a loss of over half the sample for follow-up. In Ethiopia, poor implementation of data collection resulted in missing data. In Bangladesh, there were substantial differences between the treatment and control groups in their participation in other early childhood programs, with 69 percent of the control group compared to 11 percent of the intervention group attending other early childhood programs. In Tajikistan, the program was suspended during the winter for two months, thus impacting the implementation of all 35 planned sessions. The report did not provide information about the exact number of planned participants lost from the evaluation due to data collection difficulties; only the numbers of participants in each country's evaluation are included. No significant risks of bias were evident in the trial in Yemen.

4.4 Synthesis of Results

4.4.1 Effects of educational television

Two educational television studies, Baydar et al. (2008) and Borzekowski and Henry (2011), met the criteria for inclusion in the review. However, neither study provided the summary statistics needed to compute effect sizes. Borzekowski and Henry (2011) randomly assigned children to three levels of exposure to *Jalan Sesama*: control, low, and high. The high-exposure group watched three to four episodes of the target program over a 14 week period, while the low-exposure group watched one episode a week over 14 weeks. Children's performance was assessed in letter recognition, phonemic awareness, and writing. The data were analyzed using regression to control for baseline scores, gender, age, parent education, and exposure. Children with the most exposure to the target intervention had the largest increases in test scores from baseline to post-treatment.

Baydar et al. (2008) randomly assigned low-income mothers and their preschool children to one of three groups: an experimental group that was asked to watch the intervention program for 13 weeks, a control group that was asked to watch an alternative program for 13 weeks, and a natural observation group that was informed of the intervention program but not required to watch any television during the study. The study reported on a regression analysis using self-reported exposure to the target intervention program and pretest assessments to compare the groups on syllabification and vocabulary. The effects of the target intervention were related to the level of exposure, with preschool children with the highest exposure to the target program performing higher than the children in the control group or the natural observation group.

4.4.2 Effects of interventions to help parents support their children's school readiness

There were five studies in this category. Four of the studies were of the Open Society Institute's *Getting Ready for School* intervention and the fifth was the evaluation of the *Pre-*

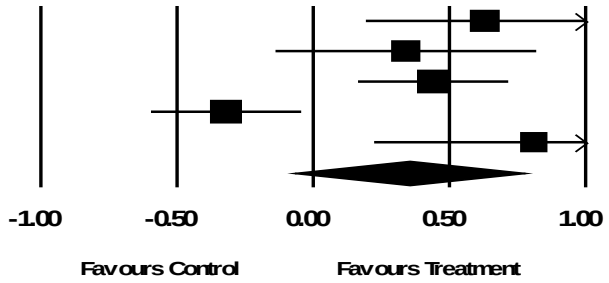
Reading Training Program. All five of these studies were included in a meta-analysis. The effect sizes for the Open Society Institute studies were computed using Hedges' (2007) d_{T2} estimate, which requires the use of the intraclass correlation coefficient, ρ, and an estimate of S_T, the total variance for the outcome. The *Family Supported Pre-Reading Program* study used a non-clustered trial design, and the usual standardized mean difference as given in equation (1) was used to compute the effect size. For the meta-analysis, only the measure of basic literacy was used as this measure was closest conceptually to those in the other four studies. Because basic literacy was only measured at post-test, this study appears only in the analysis for the immediate post-test. Table 28 and Table 29 in the Data and Analyses section provide the summary statistics used to compute the effect sizes for the two sets of studies. See Table 5 and Table 6 (below) for results of the meta-analysis.

OSI's *Getting Ready for School* initiative measured children's beginning literacy in the areas of print concepts, letter sounds, letter identification, and beginning writing, given as an immediate posttest and as a follow-up in year 2. The *Family Supported Pre-Reading Program* study measured basic reading and writing skills—including letter identification and reading and writing simple words and sentences—given as an immediate posttest. The estimates of the effect size for the immediate literacy assessment were heterogeneous, with a variance component of τ^2 equal to 0.19 that is significantly different from zero (χ^2= 24.47, *df*=4, *p*=0.00). The value of I^2 is 83.65. The overall mean effect size is 0.35 with a 95 percent confidence interval that includes zero (-0.074, 0.77). Given the significant heterogeneity, and the potential bias for non-equivalent groups in Armenia, Kazakhstan and Tajikistan, the mean effect size should be interpreted with caution. We did not conduct a sensitivity analysis excluding these three studies as there are only five studies in the review. The year 2 literacy assessment is also heterogeneous, with the study from Tajikistan contributing a large effect size of 1.74. The variance component of τ^2 is equal to 0.69, and is significantly different from zero (χ^2= 71.19, *df*=3, *p*=0.00). The value of I^2 is 95.79. The overall effect size mean is 0.48 with a 95 percent confidence interval that covers zero (-0.36, 1.31). The mean effect sizes for beginning literacy both in the immediate posttest and in the year 2 follow-up are not different from zero. The significant heterogeneity, and potential problems with non-equivalent groups in Armenia, Kazakhstan and Tajikistan require caution in the interpretation of the mean effect size. We did not conduct a sensitivity analysis excluding these three studies as there are only five studies in the review.

Table 5: Parent Education Studies: Overall Literacy of Year 1

Overall Literacy Year 1

Studyname	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Armenia	0.630	0.224	0.050	0.192	1.068	2.817	0.005
Bosnia	0.340	0.245	0.060	-0.140	0.820	1.388	0.165
Kazakhstan	0.440	0.141	0.020	0.163	0.717	3.111	0.002
Tajikistan	-0.320	0.141	0.020	-0.597	-0.043	-2.263	0.024
Buyuktaskapu	0.810	0.300	0.090	0.222	1.398	2.700	0.007
	0.350	0.216	0.047	-0.074	0.774	1.620	0.105

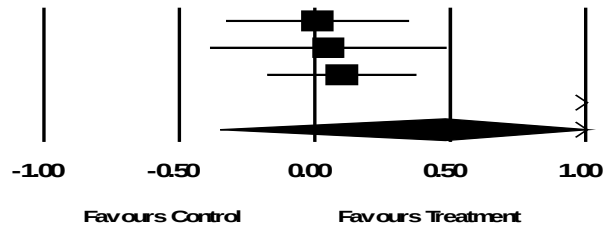


Cluster-adjusted Effect Sizes

Table 6: Parent Education Studies: Overall Literacy of Year 2 (Grade 1)

Overall Literacy Year 2

Studyname	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Armenia	0.010	0.173	0.030	-0.329	0.349	0.058	0.954
Bosnia	0.050	0.224	0.050	-0.388	0.488	0.224	0.823
Kazakhstan	0.100	0.141	0.020	-0.177	0.377	0.707	0.480
Tajikistan	1.740	0.173	0.030	1.401	2.079	10.046	0.000
	0.477	0.424	0.180	-0.355	1.308	1.123	0.261



Cluster-adjusted Effect Sizes

4.4.3 Effects of tutoring interventions

As described above, the *Read India* and the *Getting Ready for School: A Child-to-Child Approach* interventions used different mechanisms for delivering tutoring support. We were unable to include *Read India* in the meta-analysis because the study did not report on the tutoring separately, and thus was not an intervention that could be compared to the other tutoring interventions. Therefore, the five studies of *Getting Ready for School: A Child-to-Child Approach* were combined for meta-analysis, but the effects of *Read India* are reported separately.

Getting Ready for School: A Child-to-Child Approach

For the *Getting Ready for School: A Child-to-Child Approach* studies, schools or districts were randomly assigned to treatment and control groups. Effect sizes for these studies were computed using Hedges' (2007) d_{T2} estimate, which requires the use of the intraclass correlation coefficient, ρ, and an estimate of S_T, the total variance for the outcome. Table 30 and Table 31 in the Data and Analyses section provide the summary statistics used to compute the effect sizes. The trial in Bangladesh differed from the other studies in that the treatment was randomly assigned to subdistricts, and thus the third-level intraclass correlation was used for the computation of the effect sizes at the level of the subdistrict. See Tables 7 through 13 (below) for results of the meta-analysis.

Tables 24 through 30 present the Forest plots for the literacy outcomes in years 1 and 2 for the *Getting Ready for School: A Child-to-Child Approach* intervention. For the Reading Total score in year 1, there is significant heterogeneity among the studies. The estimate of the variance component, τ^2, is equal to 0.162, and is significantly different from zero (χ^2= 26.37, *df*= 3, *p*=0.00). The value of I^2 is 88.62, also indicating significant variation among studies. The overall mean effect size is 0.15, but the 95 percent confidence interval covers zero (-0.27, 0.58). There is also significant heterogeneity among studies on the subscale scores. The Beginning Reading subscale has a variance component, τ^2, equal to 0.061, and is significantly different from zero (χ^2= 10.60, *df*=3, *p*=0.014). The value of I^2 is 71.68. On the Letter Identification subscale, the variance component, τ^2, is equal to 0.13, and is significantly different from zero (χ^2 = 24.35, *df*=4, *p*=0.00). The value of I^2 is 83.57. Neither of the mean effect sizes is significantly different from zero.

There is also significant variation among studies on the Writing scale in year 1. The variance component, τ^2, is equal to 0.046, and is significantly different from zero (χ^2= 10.28, *df*=4, *p*=0.036). The value of I^2 is 61.08. Unlike the other outcomes in year 1, the mean effect size for Writing is significantly different from zero, with a value of 0.265 and a 95 percent confidence interval of (0.018, 0.51).

The year 2 outcomes included Reading, Writing, and Overall Literacy. There is significant variation among the three studies that report the Reading follow-up, with a variance component, τ^2, equal to 0.058, significantly different from zero (χ^2= 7.8, *df*=2, *p*=0.020). The value of I^2 is 74.36. The mean effect size for Reading is not significantly different from zero. The three studies that report a Writing follow-up assessment are homogeneous, with a variance component of τ^2 equal to 0.00. The value of I^2 is also 0.0. The overall mean effect size is 0.03, with a 95 percent confidence interval that covers zero (-0.10, 0.17). The three studies that report the Overall Literacy measure are also homogeneous, with a variance component of τ^2 equal to 0.031 and an I^2 of 38.05. The mean effect size is 0.055, with a 95 percent confidence interval that covers zero (-0.15, 0.26).

As discussed earlier, three of the five studies included in this meta-analysis were RCTs (Bangladesh, Yemen and Tajikistan). A sensitivity analysis excluding quasi-experimental designs would be based on only three studies. We prefer to use caution in interpreting the results given the small number of studies, all conducted under the same program.

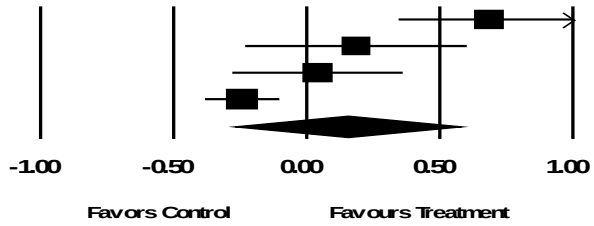
READ India

Banerjee et al. (2008) met the study inclusion criteria, but the intervention included both tutoring support and library visits. The study did not report on the results of the tutoring intervention separately, and thus the study was not included in the meta-analysis. Banerjee et al. (2008) report on a randomized experiment to increase community members' awareness of and participation in local schools' functioning and children's educational outcomes. One of the three interventions in the study included training villagers to teach children reading skills using the *Read India* program. Children exposed to the *Read India* intervention increased their reading skills compared to children in a control group, with children with the lowest pretest scores making the most improvement (Table 32 in Data and Analyses section).

Table 7: UNICEF Child-to-Child Studies: Reading Total Score of Year 1

Reading Total Post-test

Model	Studyname	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
	DRC	0.685	0.174	0.030	0.343	1.027	3.929	0.000
	Ethiopia	0.185	0.213	0.045	-0.233	0.603	0.868	0.385
	Tajikistan	0.041	0.164	0.027	-0.281	0.362	0.248	0.804
	Bangladesh	-0.243	0.072	0.005	-0.384	-0.101	-3.366	0.001
Random		0.151	0.217	0.047	-0.274	0.576	0.696	0.486

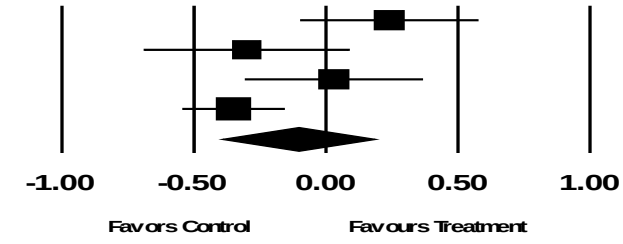


Cluster-adjusted Effect Sizes

Table 8: UNICEF Child-to-Child Studies: Beginning Reading Subtest of Year 1

Beginining Reading Subscore Post-test

Study name	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
DRC	0.240	0.173	0.030	-0.099	0.579	1.386	0.166
Ethiopia	-0.300	0.200	0.040	-0.692	0.092	-1.500	0.134
Tajikistan	0.030	0.173	0.030	-0.309	0.369	0.173	0.862
Bangladesh	-0.350	0.100	0.010	-0.546	-0.154	-3.500	0.000
	-0.107	0.147	0.022	-0.396	0.182	-0.728	0.467

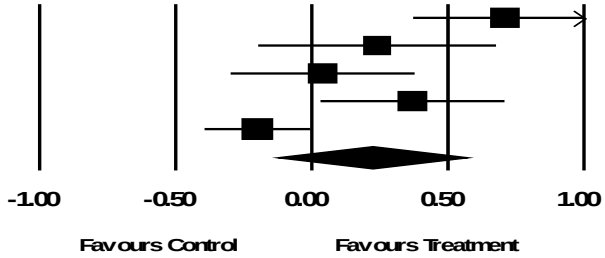


Cluster-adjusted Effect Sizes

Table 9: UNICEF Child-to-Child Studies: Letter Identification Subtest of Year 1

Letter Identification Posttest

Studyname	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
DRC	0.710	0.173	0.030	0.371	1.049	4.099	0.000
Ethiopia	0.240	0.224	0.050	-0.198	0.678	1.073	0.283
Tajikistan	0.040	0.173	0.030	-0.299	0.379	0.231	0.817
Yemen	0.370	0.173	0.030	0.031	0.709	2.136	0.033
Bangladesh	-0.200	0.100	0.010	-0.396	-0.004	-2.000	0.046
	0.219	0.178	0.032	-0.129	0.568	1.234	0.217

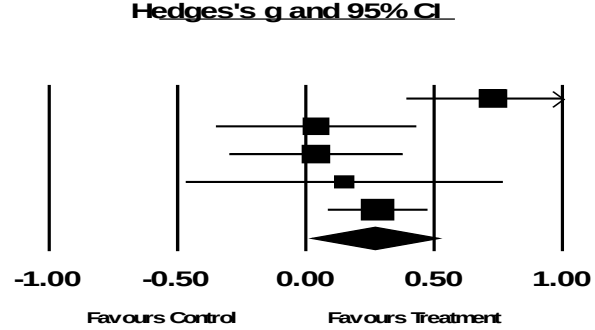


Cluster-adjusted Effect Sizes

Table 10: UNICEF Child-to-Child Studies: Writing Subtest of Year 1

Writing Post-test

Study name	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
DRC	0.730	0.173	0.030	0.391	1.069	4.215	0.000
Ethiopia	0.040	0.200	0.040	-0.352	0.432	0.200	0.841
Tajikistan	0.040	0.173	0.030	-0.299	0.379	0.231	0.817
Yemen	0.150	0.316	0.100	-0.470	0.770	0.474	0.635
Bangladesh	0.280	0.100	0.010	0.084	0.476	2.800	0.005
	0.265	0.126	0.016	0.018	0.512	2.105	0.035

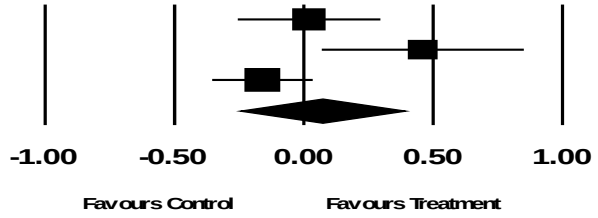


Cluster-adjusted Effect Sizes

Table 11: UNICEF Child-to-Child Studies: Reading Achievement of Year 2 (Grade 1)

Reading Achievement Follow-up

Study name	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Tajikistan	0.020	0.141	0.020	-0.257	0.297	0.141	0.888
Yemen	0.460	0.200	0.040	0.068	0.852	2.300	0.021
Bangladesh	-0.160	0.100	0.010	-0.356	0.036	-1.600	0.110
	0.069	0.163	0.027	-0.250	0.388	0.423	0.672

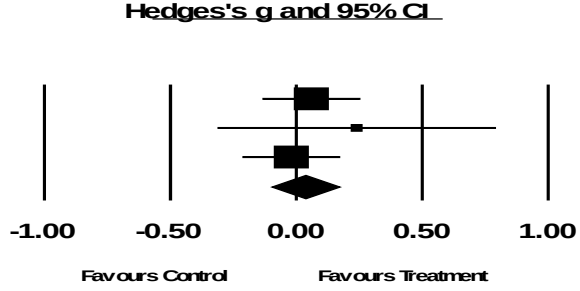


Cluster-adjusted Effect Sizes

Table 12: UNICEF Child-to-Child Studies: Writing Achievement of Year 2 (Grade 1)

Writing Achievement Follow-up

Study name	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Tajikistan	0.060	0.100	0.010	-0.136	0.256	0.600	0.549
Yemen	0.240	0.283	0.080	-0.314	0.794	0.849	0.396
Bangladesh	-0.020	0.100	0.010	-0.216	0.176	-0.200	0.841
	0.033	0.069	0.005	-0.102	0.167	0.480	0.631

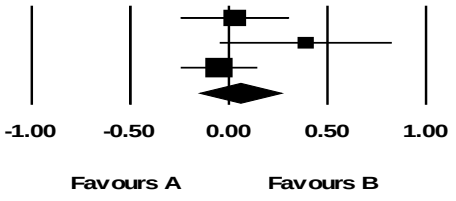


Cluster-adjusted Effect Sizes

Table 13: UNICEF Child-to-Child Studies: Overall Literacy of Year 2 (Grade 1)

Overall Literacy Follow-up

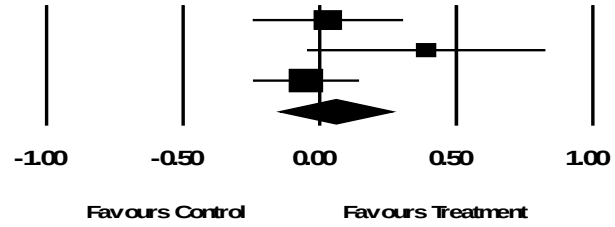
Study name	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Tajikistan	0.030	0.141	0.020	-0.247	0.307	0.212	0.832
Yemen	0.390	0.224	0.050	-0.048	0.828	1.744	0.081
Bangladesh	-0.050	0.100	0.010	-0.246	0.146	-0.500	0.617
	0.055	0.106	0.011	-0.152	0.262	0.520	0.603



Cluster-adjusted Effect Sizes

Overall Literacy Grade 1

Studyname	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Tajikistan	0.030	0.141	0.020	-0.247	0.307	0.212	0.832
Yemen	0.390	0.224	0.050	-0.048	0.828	1.744	0.081
Bangladesh	-0.050	0.100	0.010	-0.246	0.146	-0.500	0.617
	0.055	0.106	0.011	-0.152	0.262	0.520	0.603



Cluster-adjusted Effect Sizes

5. Discussion

5.1 Summary of Main Results

We included studies in three topic areas: educational television, interventions that teach parents how to support their children's school readiness, and tutoring by older peers or community members.

In the area of educational television, two studies showed that children who received high levels of exposure to educational programming (at least 3 to 5 times per week) outperform the low-exposure and control groups in literacy development (such as vocabulary), although the exact size of this effect was unclear. It is important to note that these results were obtained in contexts where children do not have heavy exposure to "screen time" otherwise.

There were five studies that assessed the effects of interventions intended to support parents' ability to help their children develop school readiness (including in the area of literacy). Across studies, we found no significant effect of this approach on children's literacy development. However, there were positive impacts for individual studies. The low number of studies does not allow us to draw conclusions about where, how, or with whom these interventions must be implemented to achieve an effect on children's literacy.

The *Read India* and the *Getting Ready for School: A Child-to-Child Approach* interventions used different mechanisms for delivering tutoring support. The *Getting Ready for School* intervention used peer-assisted learning, and had a significant effect on children's early writing across countries, and significant effects on other aspects of children's literacy development in some countries. These effects were sustained over time in some but not all cases. The *Read India* intervention used community members to help children increase their reading skills, with children with the lowest pretest performance making the most improvement.

All of these interventions relate to the logic model presented in Figure 1. They showed that at least in some contexts, providing education and support to parents, families and community members can lead to behavior change among those groups (such as spending time showing children how to write letters), which in turn leads to improved literacy outcomes. In other cases, adults create programming delivered through mechanisms such as educational television and radio, and in this way influence children's literacy development.

5.2 Overall Completeness and Applicability of Evidence

Our screening of 10,430 citations from across academic and grey literature yielded just 13 studies that met our criteria, from across three topic areas (plus studies of educational radio that were excluded from the current review because a review of its effects already existed). The comprehensiveness of our search and ability to obtain all articles identified for review makes us confident that we identified the literature that was available. But these results also tell us that there are serious limitations in the availability of evidence.

We found that there are many types of interventions occurring in LMICs that are intended to improve children's literacy outcomes and take place outside of the formal education system. However, only a fraction of these types of interventions offer any empirical evidence regarding their effectiveness. This leaves a large number of intervention approaches that do not appear to have empirical evidence for (or against) their effectiveness in improving children's literacy development. Many of these interventions are widely used in LMICs and receive significant investment, such as the provision of libraries (standing or mobile),

distribution of books and print materials (including local language publishing), the teaching of literacy through religious instruction, and the distribution of laptops and e-readers. For example, a recent comprehensive review found a widespread use of mobile technology in LMICs as part of the effort to improve children's literacy but found almost no empirical evidence regarding the effectiveness of these efforts and investments (Wagner, Castillo, Murphy, Tuz Zahra, Crofton, & Phelan, 2014).

There are also significant gaps in the literature with regard to the age of children receiving the intervention. Only one of the studies we identified (*Read India*) involved children past age 7. The remainder focused on children ages 3 through 6. Early childhood is a critical time for development, but we also know that many children continue to need additional support to become fluent readers as they move through primary school.

The available literature does not allow us to draw any conclusions regarding the relative effects of interventions by context (for example, with children whose parents are literate versus illiterate, or with children who are monolingual versus dual language learners).

And finally, Latin American countries are noticeably absent from this list, despite our efforts to access both academic and grey literature in English, French, and Spanish. Some studies from Latin America were identified in the initial search, but none met our criteria for inclusion in this review.

5.3 Quality of the Evidence

Among studies of a relevant intervention screened for this review, they quite clearly fell into two categories: studies that used a rigorous evaluation design and studies that did not. For studies that were excluded on methodological grounds, in all cases the issue was either the lack of a control group or the use of a quasi-experimental design without a baseline. As noted in the section on Selection of Studies, we did include in the review the four OSI studies that reported differences in baseline measures of literacy and preliteracy. These four studies all evaluated the same intervention in different countries, and provided some tentative evidence for the treatment's effectiveness. There were no studies that *almost* made it into the review.

Even though included studies used a rigorous evaluation design, they all suffered from potential bias either from differences in the control and treatment groups at baseline, or from reported problems with data collection in difficult regions. Thus, the meta-analysis results must be interpreted with caution.

We were able to calculate effect sizes for 11 of the 13 studies included in this review. The studies overlapped substantially in the types of outcomes assessed and the age groups of children studied, allowing us to combine studies for meta-analysis across two topics.

5.4 Limitations and Potential Biases in the Review Process

There were several limitations to this review. First, we had hoped to obtain information that would allow us to identify the relative effectiveness of different interventions in the same context. In other words, we were hoping to be able to provide information for the field regarding the effectiveness of interventions with the same conditions and those conducted for different populations within the same general context. The scarcity of empirical studies and their limited focus on just a few interventions prevents us from being able to provide this information. Numerous descriptions of interventions exist, but few contained a study of program effectiveness in reference to a comparison group. Second, we found only one study that addressed an intervention for children ages 7 and older, and found no studies from Latin

America. Therefore, we are left with significant gaps in our understanding of what works in LMICs to improve children's literacy outcomes using interventions outside of the formal education system.

5.5 Agreements and Disagreements With Other Studies and Reviews

The current review complements a review of the effectiveness of educational radio in improving children's literacy outcomes in Sub-Saharan Africa (Ho & Thukral, 2009). This review's authors are not aware of any other studies or systematic reviews in LMICs that assess the effectiveness of interventions outside of the formal education system for improving children's literacy development.

6. Authors' Conclusions

6.1 Implications for Practice and Policy

Educational Television

Educational television approaches to child literacy in developing countries attempt to use on-air television broadcasts or DVDs of TV programs to promote a variety of literacy and other developmental outcomes in preschool children, from letter recognition, pattern grouping, and basic counting, to health, social development, and cultural awareness. Most educational efforts are intended to be compensatory, provided in countries where formal preschool programs are either not widely available or not widely affordable, and target children and families from lower socio-economic backgrounds. Few are intended primarily to supplement school- or center-based programs already accessed by children.

There has been extensive research on the extent of general television viewing by preschool children, and a broad range of effects, both positive and negative, have been reported. Negative effects generally are associated with entertainment viewing, and positive effects generally associated with viewing educational television. Most studies of educational television have examined the effects of children watching local translations or adaptations of *Sesame Street,* which is available in more than 120 countries. However, most studies are correlational, and few reports use even quasi-experimental designs, much less true experimental designs that use a randomized controlled trial approach. Thus, although the majority of the research points to positive child literacy outcomes associated with watching educational programs, confidence in that conclusion is reduced by the nonexperimental approaches used in the great majority of the studies. The studies reviewed here did show that educational television (whether viewed at home or outside of the home) has a positive effect on children's early literacy development when children view these programs three to five days per week over several months. Occasional viewing did not produce these effects.

Parent Education and Training Programs

Among the most common out-of-school approaches to supporting children's early academic learning are programs that aim to help parents be better able to support their child's learning. In the developing world, these approaches are typically used in settings of limited formal preschool opportunities but high rates of parental literacy. Programs are quite varied in structure, duration and intensity; with take-home assignments for parents and children to work on between sessions. This approach requires parents or other adult caregivers to have the time available to attend sessions and to engage in these activities with their children.

The results of the current review tell us that, though these approaches may work well in some contexts, there is no evidence that they work universally. However, the limited number of studies available makes it difficult to draw any valid conclusions regarding the kind of context and/or intervention required for this approach to have a positive effect.

Tutoring Approaches

Child-to-child approaches to literacy in developing countries attempt to use older children in primary grades to help preschool children develop literacy skills. There is a vast body of literature in general on peer "helping" or "mentoring" in developed countries, in particular on peer tutoring. These studies tend to show mostly positive, but sometimes null, results for the mentored or tutored students and generally positive outcomes for the older students who are the peer helpers, mentors, or tutors. However, these studies typically focus on school-age

children and youth helping other school-age children and youth, not on helping preprimary-aged children. They also tend to be framed as supplemental approaches to enrich school-based content learning, not as a primary approach for learning broadly foundational literacy skills. The *Read India* intervention provides a similar model, using community volunteers. These few studies suggest that the effects of tutoring vary widely from country to country.

6.2 Implications for Research

The results of this review have substantial implications for future research. There were many practices widely used in LMICs that work outside of formal education systems with a goal of improving children's learning outcomes, but that very few have any evidence for (or against) their effectiveness. The evidence that is available is almost entirely focused on children ages 5 to 7 years, and on a very limited selection of intervention strategies (Figure 3). Policymakers and practitioners implement programming that they believe will be effective, but in most cases, they do not have adequate information available for evidence-based decision making. Empirical evidence is urgently required regarding the effectiveness of interventions that are currently receiving significant investment of scarce resources, such as technology-based supports.

Too few studies were available for us to come to any conclusions regarding patterns of effectiveness. And the studies that we did find showed that similar programming can have a positive effect on children's literacy development in some contexts and none in others.

Based on this review, we make the following recommendations to improve the evidence for what works to improve children's literacy outcomes outside of formal education system: First, the field should prioritize studying interventions that are already in widespread use, but lack evidence of their effectiveness. Otherwise, there is no way for stakeholders (funders, program implementers, families, etc.) to know to what extent the intervention is a good use of their time and other resources (versus something else that may be more effective or may achieve the same or better outcomes with fewer resources).

Second, for interventions that have a positive impact at least some contexts (but maybe not others), investment should be made in replication studies to determine which children will benefit from these interventions, and under what conditions. The intervention may be effective or more effective specifically for children with certain characteristics (e.g., dual language learners, 7-year-olds, rural, etc.). The conditions of implementation include quality of implementation, dosage, delivery setting, and so on.

In carrying out these first and second recommendations, the field will begin to address our third recommendation, which is expanding the evidence base to include under-studied populations (such as children over age 7) and regions (such as Latin America).

When policymakers and practitioners select programming, they need to know what will be effective in their particular context, for the population they wish to serve. Carrying out these recommendations would greatly improve the evidence base available to stakeholders who wish to make wise decisions about what will help children in their country or community improve their literacy outcomes through support outside of formal education systems.

7. Information About This Review

7.1 Review Authors

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The lead author is the person who develops and coordinates the review team, discusses and assigns roles for individual members of the review team, liaises with the editorial base, and takes responsibility for the on-going updates of the review.

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7.2 Roles and Responsibilities

The work was led by AIR, in collaboration with Search Institute and Yale University, as well as with expert consultants.

The team was led by Principal Investigator Elizabeth Spier, who has extensive experience in conducting international education evaluations. Team members included Pia Britto, an expert in child development and education; Eugene Roehlkepartain, an expert in parent, family, and community engagement to improve child outcomes; and Terri Pigott, Yael Kidron, and Mengli Song, experts in systematic review methods. Janis Glover, Yale Senior Reference Librarian, provided her extensive expertise in information retrieval, and she was assisted by Michael McCarthy. Dan Wagner, an expert of literacy in multiple international contexts, served as senior advisor.

An advisory board, comprised of academic researchers from developing countries, provided input about literatures and contexts, and helped with dissemination of review results through their networks.

Quality assurance was provided by Julia Lane, who brings skills in statistics in the education context, and by AIR's professional editors.

To summarize:

- Content: Pia Britto, Elizabeth Spier, Dan Wagner, Eugene Roehlkepartain
- Systematic review methods: Terri Pigott, Yael Kidron
- Statistical analysis: Terri Pigott, Mengli Song
- Information retrieval: Michael McCarthy, Janis Glover

7.3 Sources of Support

This review is being conducted under the auspices of 3ie and is funded by an USAID grant. AIR is also providing financial support to facilitate the completion of this work.

7.4 Declaration of Interest

The authors have no vested interest in the outcomes of this review nor have any incentive to represent findings in a biased manner.

7.5 Plans for Updating the Review

Given the rapid increase in the use of rigorous evaluations in the field, it would be highly beneficial to update this review within the next few years. The authors of this review would be pleased to complete such an update, should funding become available.

7.6 Author Declaration

Authors' Responsibilities

By completing this form, you accept responsibility for maintaining the review in light of new evidence, comments and criticisms, and other developments, and updating the review at least once every five years, or, if requested, transferring responsibility for maintaining the review to others as agreed with the Coordinating Group. If an update is not submitted according to agreed plans, or if we are unable to contact you for an extended period, the relevant Coordinating Group has the right to propose the update to alternative authors.

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Tables

Table 14: List of Excluded Studies

Study	Reason for Exclusion
Aboud & Hossain (2011)	Intervention not delivered through parents, family members, or community members
Aboud, Hossain, & O'Gara (2008)	Lack of a valid comparison group, no valid baseline
Adnams, Sorour, Kalberg, Kodituwakku, Perold, Kotze, September, et al. (2007)	Intervention not delivered through parents, family members, or community members
Aga Khan Development Network (2012)	Program information summary, not an evaluation report
Begeny, Yeager, & Martínez (2012)	Intervention not delivered through parents, family members, or community members
Bekman (2004)	QED with no valid baseline
Bekman, Aksu-Koç, & Erguvanlı-Taylan (2011)	Intervention not delivered through parents, family members, or community members
Bernbaum, Rivero Herrera, & Schiefelbein (2010)	Intervention not delivered through parents, family members, or community members
Borzekowski & Macha (2010)	Intervention not delivered through parents, family members, or community members
Brooker, Okello, Njagi, Dubeck, Halliday, Inyega, & Jukes (2010)	Description of a future study, not a completed study
Cardoso-Martins, Lara Mesquita, & Ehri (2011)	Intervention not delivered through parents, family members, or community members
de Souza, de Rose, Faleiros, Bortoloti, Hanna, & McIlvane (2009)	Intervention not delivered through parents, family members, or community members
Cristia, Ibarrarán, Cueto, Santiago, & Severín (2012)	This intervention was intended to include a home component, with children using laptops at home, but few children took their laptops outside of school, and the intervention was not really delivered through parents, families or community members.
Dixon, Schagen, & Seedhouse (2011)	Intervention not delivered through parents, family members, or community members
Dowd & Advisor (2011)	Program information summary, not an evaluation report

Study	Reason for Exclusion
Educational Development Center (2012)	Topic area is educational radio
Educational Development Center (2009)	Topic area is educational radio
Educational Development Center (2007)	Topic area is educational radio
Işikdoğan & Kargin (2010)	Intervention not delivered through parents, family members, or community members
Lucas, McEwan, Ngware, & Oketch (2013)	Intervention not delivered through parents, family members, or community members
Martinez, Naudeu, & Pereira (2013)	Intervention not delivered through parents, family members, or community members
Mills-Tettey, Mostow, Dias, Sweet, Belousov, Dias, & Gong (2009)	Intervention not delivered through parents, family members, or community members
Mishra & Lal (2006)	Intervention not delivered through parents, family members, or community members
Mithani, Alam, Babar, Dowd, Hanson, & Ochoa (2011)	Intervention is primarily delivered through teachers at schools. There is a parent involvement component, but its effects have not been assessed independently of the teacher-delivered component.
Neugebauer & Currie-Rubin (2009)	Intervention not delivered through parents, family members, or community members
Ntuli & Pretorius (2005)	Lack of a valid comparison group, no valid baseline
Olivier, Anthonissen, & Southwood (2010)	Intervention not delivered through parents, family members, or community members
Opel, Ameer, & Aboud (2009)	Intervention not delivered through parents, family members, or community members
Piper & Korda (2011)	Intervention not delivered through parents, family members, or community members
Pretorius & Machet (2008)	It is unclear whether there is a valid comparison group, and there is no valid baseline
Rolla San Francisco, Arias, Villers, & Snow (2006)	Lack of a valid comparison group, no valid baseline
Sailors, Hoffman, Pearson, Beretvas, & Metthee (2010)	Intervention not delivered through parents, family members, or community members

Study	Reason for Exclusion
Save the Children (2007)	Program information summary, not an evaluation report
Şimşek Çetin & Alisinanoğlu (2013)	Intervention not delivered through parents, family members, or community members
USAID Malawi (2009)	Intervention not delivered through parents, family members, or community members
Van der Bijl, Alant, & Lloyd (2006)	Intervention not delivered through parents, family members, or community members
Visser & Chamberlain (2004)	Intervention not delivered through parents, family members, or community members
Walter & Dekker (2011)	Intervention not delivered through parents, family members, or community members
Wu, Anderson, Li, Wu, Li, Zhang, et. al. (2009)	Intervention not delivered through parents, family members, or community members

Table 15: Attributes of the Study of Jalan Sesama

Location	Three villages (Munjul, Kota Dukuh, and Gunung Batu) in the Pandeglang District, Banten Province, Indonesia
Design	Randomized controlled trial
Group Formation	The children were randomly assigned to one of three conditions: 1. High-exposure group 2. Low-exposure group 3. Control group
Participants	High-exposure group = 58 children Low-exposure group = 48 children Control group = 54 children Additional demographics: • Average age was 4.9, with an age range of 3.5 to 6 years old • 83 girls (52%) and 77 boys (48%) • Many children attended school (43% of high-exposure group, 60% of low-exposure group, 85% of control group)
Conditions	High-exposure group: Invited to watch 3 to 4 episodes of Jalan Sesama per week for 14 weeks (52 episodes total) Low-exposure group: Invited to watch 1 episode of Jalan Sesama per week for 14 weeks (14 episodes total) Control group: Invited to watch 1 episode of another popular children's television program (such as Dora the Explorer, Tom and Jerry, or Sponge Bob Square Pants) per week for 14 weeks (14 episodes total)
Literacy Outcomes Assessed	At outcome only: • Letter recognition • Reading (phonemic awareness) • Writing
Attrition	There was zero attrition across all three groups.

Table 16: Attributes of the Study of Will You Play With Me?

Location	Largest metropolitan area in Turkey
Design	Randomized controlled trial
Group Formation	The children were randomly assigned to one of three groups: 1. Intervention group 2. Control group 3. Natural observation group
Participants	Intervention group = 139 children and their families Control group = 127 children and their families Natural observation group = 133 children and their families Additional demographics: • Average age 5 years 3 months, and ranged from 4 years 7 months to 7 years 3 months • The intervention group consisted of 50.4% boys, the control group 52.0% boys, and the natural observation group 58.1% boys • Mothers averaged 5.5 years of education in the intervention group, 5.1 years in the control group, and 4.9 years in the natural observation group
Conditions	Intervention group: Parents were instructed to have their children watch *Will You Play With Me?* daily for 13 weeks (65 episodes total) Control group: Parents were instructed to have their children watch another television program (that was on opposite *Will You Play With Me?*) daily for 13 weeks (65 episodes total) Natural observation group: Parents were informed about *Will You Play With Me?* and its potential benefits but were not given further instructions (they were free to have their children watch the program or not, as they saw fit)
Literacy Outcomes Assessed	At outcome only: • Syllabification • Vocabulary
Attrition	There was 5% attrition in the intervention group, 9% attrition in the control group, and 29% in the natural observation group.

Table 17: Attributes of the Study of the Family Supported Reading Program

Location	Konya, Turkey
Design	Quasi-experimental design
Group Formation	Intervention group children were drawn from one nursery school program, and control group students attended other nursery school programs (but not the same nursery school as the intervention group).
Participants	Intervention group = 25 children and their families Control group = 25 children and their families Additional demographics: • The intervention group consisted of children attending a specific pre-primary class in 2009-2010 and enrolled in Grade 1 in 2010-2011 • The control group consisted of children who had attended other pre-primary programs in 2009-2010 and enrolled in Grade 1 in 2010-2011. It is unclear whether the control group was drawn from a single other pre-primary class, or multiple classes
Conditions	Intervention group: Parents were invited to participate in 13 weekly program sessions Control group: Parents were not invited to any program sessions
Literacy Outcomes Assessed	At outcome only: • Reading comprehension • Mechanical reading skills • Writing
Attrition	There was zero attrition across both study groups.

Table 18: Attributes of the Study in Armenia of OSI's Getting Ready for School

Location	Provinces of Kotayk, Yeghegnadzor, Yerevan, Gegharkunik, and Tavush, Armenia
Design	Experimental design
Group Formation	The families were divided into one of two groups: 1. Intervention group 2. Control group Communities were stratified by province then randomly assigned to the intervention group or the control group. The intervention group consisted of communities in which the program was made available to all parents with children who were 1 year away from on-time school entry. The control group consisted of communities in which the program was not made available.
Participants	Intervention group = 17 communities (123 families) Control group = 15 communities (120 families) (In communities with more than 25 eligible families, 25 families were randomly selected for the study; in communities with fewer than 25 eligible families, all eligible families were included in the study sample.) Additional demographics: • Most children were 5 years old at the time of baseline (93% of intervention group and 93% of control group). • Intervention group was 44% female, and control group was 38% female.
Conditions	Intervention group: Parents were invited to participate in nine monthly program sessions. Control group: Parents were not invited to any program sessions, and the program was not available in their community.
Literacy Outcomes Assessed	At baseline and outcome: • Letter identification • Phonics • Print concepts • Reading (words) • Writing At last follow-up (end of Grade 1): • Phonics • Reading comprehension • Rhyming • Teacher ratings of child's literacy development • Writing
Attrition	By the end of Grade 1 (last follow-up), 7% of the intervention group and 11% of the control group had been lost to attrition.

Table 19: Attributes of the Study in Bosnia and Herzegovina of OSI's Getting Ready for School

Location	Communities of Jablanica, Kiseljak, Tuzla (Sjenjak), and Prijedor (Kokin Grad) in Bosnia and Herzegovina
Design	Quasi-experimental design
Group Formation	The communities were divided into one of two groups: 1. Intervention group 2. Control group Communities were selected to receive the intervention. Then, one community that matched requirements was identified for each intervention village. Matching was based on demographic information, such as community size, region, ethnic characteristics, and whether it was urban or rural. The intervention group consisted of communities in which the program was made available to all parents with children who were 1 year away from on-time school entry. The control group consisted of communities in which the program was not made available.
Participants	Intervention group = 4 communities (101 families) Control group = 4 communities (110 families) Additional demographics: • Children in both groups averaged 5 years old at the time of baseline.
Conditions	Intervention group: Parents were invited to participate in nine monthly program sessions. Control group: Parents were not invited to any program sessions, and the program was not available in their community.
Literacy Outcomes Assessed	At baseline and outcome: • Letter identification • Phonics • Print concepts • Reading (words) • Writing At last follow-up (end of Grade 1): • Teacher ratings of child's literacy development
Attrition	By the end of Grade 1 (last follow-up), 26% of the intervention group and 18% of the control group had been lost to attrition.

Table 20: Attributes of the Study in Kazakhstan of OSI's Getting Ready for School

Location	Communities of Melliorator, Zapadnii, Kirgauldi village, and Irgeli village, Kazakhstan
Design	Quasi-experimental design
Group Formation	The communities were divided into one of two groups: 1. Intervention group 2. Control group Communities were selected to receive the intervention. Then, one community that matched requirements was identified for each intervention village. Matching was based on demographic information, such as community size, region, ethnic characteristics, and whether it was urban or rural. Individual control group families were matched with individual intervention group families based on demographic characteristics, such as child age and child gender.
Participants	Intervention group = 4 communities (110 families) Control group = 4 communities (110 families) Additional demographics: • Children in both groups averaged age 5.5 at the time of baseline.
Conditions	Intervention group: Parents were invited to participate in nine monthly program sessions. Control group: Parents were not invited to any program sessions, and the program was not available in their community.
Literacy Outcomes Assessed	At baseline and outcome: • Letter identification • Phonics • Print concepts • Reading (words) • Writing At last follow-up (end of Grade 1): • Teacher ratings of child's literacy development
Attrition	By the end of Grade 1 (last follow-up), 5% of the intervention group and 3% of the control group had been lost to attrition.

Table 21: Attributes of the Study in Tajikistan of OSI's Getting Ready for School

Location	Communities of Bokhtar, Kulob, Khujand, and Jamoat Vodnin, from Khatlon and Sughd provinces, Tajikstan
Design	Quasi-experimental design
Group Formation	The communities were divided into one of two groups: 1. Intervention group 2. Control group Communities were selected to receive the intervention. Then, one community that matched requirements was identified for each intervention village. Matching was based on demographic information, such as community size, region, ethnic characteristics, and whether it was urban or rural. Individual control group families were matched with individual intervention group families based on demographic characteristics, such as child age, child gender, and home language.
Participants	Intervention group = 4 communities (100 families) Control group = 4 communities (100 families) Additional demographics: • Children in both groups averaged age 6.5 at the time of baseline.
Conditions	Intervention group: Parents were invited to participate in program sessions. The number and timing of program sessions varied by community. Control group: Parents were not invited to any program sessions, and the program was not available in their community.
Literacy Outcomes Assessed	At baseline and outcome: • Letter identification • Phonics • Print concepts • Reading (words) • Writing At last follow-up (end of Grade 1): • Teacher ratings of child's literacy development
Attrition	By the end of Grade 1 (last follow-up), 4% of the intervention group and 5% of the control group had been lost to attrition.

Table 22: Attributes of the Evaluation in Bangladesh of UNICEF's Getting Ready for School: A Child-to-Child Approach

Location	Thirty communities across Bangladesh
Design	Randomized controlled trial
Group Formation	The children were divided into one of two groups: 1. Intervention group 2. Control group From each of the six administrative divisions of the country, one district and its two upazilas (subdistricts) were selected based on high drop-out and low primary school completion rates. The districts chosen were geographically representative of the country. The two upazilas in each district were randomly assigned either an intervention group or a control group. In each group's upazila, five schools were randomly selected to participate in the program (if in the intervention group) and the evaluation.
Participants	Intervention group = 30 schools, with 432 children randomly selected from within those communities to participate in the study (approximately 900 children took part in the intervention) Control group = with 451 children randomly selected from within those communities to participate in the study Additional demographics: All children were judged to be 1 year away from on-time primary school enrollment in their communities, although exact age information was unavailable.
Conditions	Intervention group: All young children in the community who were 1 year away from on-time primary school enrollment were invited to participate. Control group: Children were not invited to any program sessions, and the program was not available in their community.
Literacy Outcomes Assessed	At baseline and outcome: • Letter identification • Reading (words) • Writing At last follow-up (end of Grade 1): • Teacher ratings of child's literacy development
Attrition	At the first outcome assessment (end of program year), attrition was 12% in the intervention group and 11% in the control group. Grade 1 outcome data was unavailable for 47% of the intervention group and 5% of the control group, but this figure includes children who had not yet enrolled in Grade 1 (therefore their teachers could not be surveyed).

Table 23: Attributes of the Evaluation in Democratic Republic of Congo of UNICEF's Getting Ready for School: A Child-to-Child Approach

Location	Fifteen communities in Kinshasa and 10 in Mbandaka, Democratic Republic of Congo
Design	Quasi-experimental design
Group Formation	The children were divided into one of two groups: 1. Intervention group 2. Control group Fifteen schools in Kinshasa and 10 schools in Mbandaka were identified for the study. Then, an equal number of similar comparison schools were identified in each location.
Participants	Intervention group = 25 schools, with 375 children randomly selected (out of approximately 1,000 to 1,500 children in those communities who took part in the intervention) to participate in the study Control group = 25 schools, with 373 children randomly selected from within those communities to participate in the study Additional demographics: • Children in both the intervention and control groups averaged 5 years old. • The intervention group was 51% boys, and the control group was 46% boys.
Conditions	Intervention group: All children in the communities who were 1 year away from on-time primary school enrollment were invited to participate. Control group: Children were not invited to any program sessions, and the program was not available in their community.
Literacy Outcomes Assessed	At baseline and outcome: • Letter identification • Reading (words) • Writing
Attrition	There were significant difficulties with data collection (especially in Mbandaka) due to both impassable roads and incursions of the civil conflict. Therefore, after 1 year, follow-up data was available for only 38% of the intervention group and 35% of the control group.

Table 24: Attributes of the Evaluation in Ethiopia of UNICEF's Getting Ready for School: A Child-to-Child Approach

Location	Twenty communities from the regions of Harar, Oromia, and Tigray, Ethiopia
Design	Quasi-experimental design
Group Formation	The children were divided into one of two groups: 1. Intervention group 2. Control group School clusters were small groups of schools (typically five to seven schools in each cluster) in relative proximity, linked through one school that acted as the cluster resource center. All 20 schools participating in the program were in rural areas and were selected to take part on the basis of good working relations among the school clusters and the willingness of the headmasters. Within each cluster, 17 schools that were geographically close to and shared similar community characteristics with the intervention schools were selected to serve as comparison schools.
Participants	Intervention group = 20 schools, with 117 children randomly selected (out of approximately 2,000 children in those communities took part in the intervention) to participate in the study Control group = 17 schools, with 114 children randomly selected from within those communities to participate in the study Additional demographics: • Children in both the intervention and control groups averaged 6 years old. • The intervention group was 51% boys, and the control group was also 51% boys.
Conditions	Intervention group: All young children in the community who were 1 year away from on-time primary school enrollment were invited to participate. Control group: Children were not invited to any program sessions, and the program was not available in their community.
Literacy Outcomes Assessed	At baseline and outcome: • Letter identification • Reading (words) • Writing
Attrition	Posttest data were available only for 44% of the intervention group children and 70% of the control group children.

Table 25: Attributes of the Evaluation in Tajikistan of UNICEF's Getting Ready for School: A Child-to-Child Approach

Location	Rumi and Bokhtar, Tajikistan
Design	Randomized controlled trial
Group Formation	The children were divided into one of two groups: 1. Intervention group 2. Control group Forty schools participated in the evaluation, with 20 each from the Rumi and Bokhtar districts. Within each district, half of the schools were randomly assigned to the intervention group and half to the control group.
Participants	Intervention group = 20 schools, with 300 children randomly selected (out of approximately 2,500 children in those communities who took part in the intervention) to participate in the study Control group = 20 schools, with 300 children randomly selected from within those communities to participate in the study Additional demographics: • Children in both the intervention and control groups averaged 7 years old. • Parental literacy was high (94%) in these communities.
Conditions	Intervention group: All young children in the community who were 1 year away from on-time primary school enrollment were invited to participate. Control group: Children were not invited to any program sessions, and the program was not available in their community.
Literacy Outcomes Assessed	At baseline and outcome: • Letter identification • Reading (words) • Writing At last follow-up (end of Grade 1): • Teacher ratings of literacy development
Attrition	Less than 1% of the intervention group and less than 1% of the control group was lost to attrition at the time of the posttest. At the time of the Grade 1 follow-up, 9% of the intervention group and 8% of the control group had been lost to attrition.

Table 26: Attributes of the Evaluation in Yemen of UNICEF's Getting Ready for School: A Child-to-Child Approach

Location	Districts of Haifan, Al-Makha, and Mawza , Taiz Governorate, Yemen
Design	Randomized controlled trial
Group Formation	The children were divided into one of two groups: 1. Intervention group 2. Control group Thirty schools took part in the evaluation, with 10 each from Haifan, Al-Makha, and Mawza. Within each of the three regions, half of the schools were randomly assigned to the intervention group and half to the control group.
Participants	Intervention group = 15 schools, with 301 children randomly selected (out of approximately 700 to 1,000 children in those communities who took part in the intervention) to participate in the study Control group = 15 schools, with 300 children randomly selected from within those communities to participate in the study Additional demographics: • Children in both the intervention and control groups averaged age 5.5 years
Conditions	Intervention group: All young children in the community who were 1 year away from on-time primary school enrollment were invited to participate. Control group: Children were not invited to any program sessions, and the program was not available in their community.
Literacy Outcomes Assessed	At baseline and outcome: • Letter identification • Reading (words) • Writing At last follow-up (end of Grade 1): • Teacher ratings of literacy development
Attrition	At the time of the posttest, the attrition rate was 12% for the intervention group and 15% for the control group. At the time of the Grade 1 assessment, 19% of the intervention group children and 38% of the control group children did not have teacher surveys available. These figures reflect the fact that not all children enrolled in Grade 1 (especially in the control group).

Table 27: Attributes of the Evaluation of Read India

Location	Villages in Jaunpur District, State of Uttar Pradesh, India
Design	Quasi-experimental design
Group Formation	The villages were divided into one of two groups: 1. Intervention group 2. Control group Intervention group villages were randomly selected out of a pool of 280 villages that had participated in the baseline. Control group villages were selected (further details not available).
Participants	Intervention group = 65 villages, with 3,671 children from households randomly selected (out of 7,453 children in those communities who took part in the intervention) to participate in the study Comparison group = 85 villages with 4,730 children from households randomly within those communities to participate in the study Additional demographics: • The program was available to children 7 to 14 years old.
Conditions	Intervention group communities had the Read India program available to children. Control group villages did not have the Read India program available.
Literacy Outcomes Assessed	At outcome only: • Letter recognition • Reading (words and text)
Attrition	The analytic sample only included children who participated in both the pretest and the posttest. Original sample size is not available for the group of children involved in this specific intervention.

8. Data and Analyses

8.1 Parent Support Interventions

Table 28: Summary Statistics for Parent Support Interventions, Part I

					Intervention Group Analysis Sample		Control Group Analysis Sample	
Study	**RCT/ QED**	**Unit of Assignment**	**Outcome**	**Timing**	**N Children**	**N Clusters**	**N Children**	**N Clusters**
OSI Armenia	Cluster RTC	Community	Literacy (Baseline)	Baseline	123	5	119	5
			Literacy (Year 1)	Posttest	119	5	113	5
			Literacy (Year 2)	Follow-up (Grade 1)	108	5	111	5
OSI Bosnia & Herzegovina	QED	Community	Literacy (Baseline)	Baseline	101	4	110	4
			Literacy (Year 1)	Posttest	84	4	95	4
			Literacy (Year 2)	Follow-up (Grade 1)	75	4	90	4
OSI Kazakhstan	QED	Family/child	Literacy (Baseline)	Baseline	110	n/a	110	n/a
			Literacy (Year 1)	Posttest	107	n/a	104	n/a
			Literacy (Year 2)	Follow-up (Grade 1)	106	n/a	100	n/a
OSI Tajikistan	QED	Family/child	Literacy (Baseline)	Baseline	100	n/a	100	n/a
			Literacy (Year 1)	Posttest	95	n/a	97	n/a
			Literacy (Year 2)	Follow-up (Grade 1)	95	n/a	97	n/a

					Intervention Group Analysis Sample		Control Group Analysis Sample	
Study	**RCT/ QED**	**Unit of Assignment**	**Outcome**	**Timing**	**N Children**	**N Clusters**	**N Children**	**N Clusters**
Pre-Reading Family Support	QED	Family/child	Basic literacy (reading & writing)	Baseline	25	n/a	25	n/a
			Basic literacy (reading & writing)	Posttest	25	n/a	25	n/a
			Reading comprehension	Baseline	25	n/a	25	n/a
			Reading comprehension	Posttest	25	n/a	25	n/a
			Reading comprehension	Follow-up	25	n/a	25	n/a
			Mechanical reading skills	Baseline	25	n/a	25	n/a
			Mechanical reading skills	Posttest	25	n/a	25	n/a
			Mechanical reading skills	Follow-up	25	n/a	25	n/a
			Writing skills	Baseline	25	n/a	25	n/a
			Writing skills	Posttest	25	n/a	25	n/a
			Writing skills	Follow-up	25	n/a	25	n/a

Table 29: Summary Statistics for Parent Support Interventions, Part II

Study	Outcome	Intervention Group Mean	Control Group Mean	Means Adjusted?	Treatment Group SD	Control Group SD	Statistical Test	Effect size	SE	ICC L2
OSI Armenia	Literacy (Baseline)	0.15	-0.15	No	1.050	0.925	HLM (children/ communities)	n/a	n/a	0.10
	Literacy (Year 1)	0.29	-0.31	No	0.977	0.935	HLM (children/ communities)	0.63	0.22	0.08
	Literacy (Year 2)	0.00	-0.01	No	1.052	0.956	HLM (children/ communities)	0.01	0.17	0.03
OSI Bosnia and Herzegovina	Literacy (Baseline)	0.09	-0.08	No	1.056	0.943	HLM (children/ communities)	n/a	n/a	0.16
	Literacy (Year 1)	0.20	-0.14	No	0.964	0.998	HLM (children/ communities)	0.34	0.24	0.08
	Literacy (Year 2)	0.03	-0.02	No	0.958	1.032	HLM (children/ communities)	0.05	0.22	0.07
OSI Kazakhstan	Literacy (Baseline)	0.24	-0.24	No	1.034	0.91	Multiple regression	n/a	n/a	n/a
	Literacy (Year 1)	0.22	-0.21	No	0.863	1.106	Multiple regression	0.44	0.14	n/a
	Literacy (Year 2)	0.05	-0.05	No	1.027	0.986	Multiple regression	0.10	0.14	n/a
OSI Tajikistan	Literacy (Baseline)	0.25	-0.25	No	1.103	0.816	Multiple regression	n/a	n/r	n/a
	Literacy (Year 1)	-0.16	0.15	No	0.708	1.174	Multiple regression	-0.32	0.14	n/a
	Literacy (Year 2)	0.66	-0.66	No	0.482	0.961	Multiple regression	1.74	0.17	n/a

Table 29, continued

Study	Outcome	Intervention Group Mean	Control Group Mean	Means Adjusted?	Treatment Group SD	Control Group SD	Statistical Test	Effect size	SE	ICC L2
Pre-Reading Support	Basic literacy (reading-writing) (Baseline)	62.30	60.05	No	12.15	11.09	Mann Whitney U test	n/a	n/r	n/a
	Basic literacy (reading-writing) (Posttest)	92.85	74.25	No	13.53	29.39	Mann Whitney U test	0.81	0.30	n/a
	Reading comprehension (Baseline)	3.95	3.55	No	1.84	2.18	Mann Whitney U test	n/a	n/r	n/a
	Reading comprehension (Posttest)	7.50	5.00	No	4.44	5.12	Mann Whitney U test	0.52	0.29	n/a
	Reading comprehension (Follow-up)	7.65	5.50	No	2.03	2.13	Mann Whitney U test	1.03	0.30	n/a
	Mechanical reading skills (Baseline)	3.85	3.25	No	2.53	2.57	Mann Whitney U test	n/a	n/r	n/a

Study	Outcome	Intervention Group Mean	Control Group Mean	Means Adjusted?	Treatment Group SD	Control Group SD	Statistical Test	Effect size	SE	ICC L2
	Mechanical reading skills (Posttest)	14.25	5.07	No	8.44	8.93	Mann Whitney U test	1.06	0.30	n/a
	Mechanical reading skills (Follow-up)	19.40	16.65	No	1.04	4.55	Mann Whitney U test	0.83	0.29	n/a
	Writing skills (Baseline)	4.80	4.30	No	2.54	2.77	Mann Whitney U test	n/a	n/r	n/a
	Writing skills (Posttest)	17.65	15.45	No	4.22	5.90	Mann Whitney U test	0.43	0.29	n/a
	Writing skills (Follow-up)	19.00	17.85	No	0.00	4.29	Mann Whitney U test	0.38	0.29	n/a

8.2 Tutoring Interventions

Table 30: Statistics for UNICEF Getting Ready for School: A Child-to-Child Approach Studies, Part I

					Intervention Group Analysis Sample		Control Group Analysis Sample	
Study	**RCT/ QED**	**Unit of Assignment**	**Outcome**	**Timing**	**N Children**	**N Clusters**	**N Children**	**N Clusters**
UNICEF Bangladesh	RCT	Sub-district	Reading total	Baseline	382	6	400	6
			Beginning reading subscale	Baseline	382	6	400	6
			Letter identification subscale	Baseline	382	6	400	6
			Writing total	Baseline	382	6	400	6
			Reading total	Posttest	382	6	400	6
			Beginning reading subscale	Posttest	382	6	400	6
			Letter identification subscale	Posttest	382	6	400	6
			Writing total	Posttest	382	6	400	6
			Reading achievement	Grade 1	227	6	202	6
			Writing achievement	Grade 1	217	6	201	6
			Overall literacy achievement	Grade 1	217	6	202	6
UNICEF D. R. Congo	QED	School	Reading total	Baseline	143	25	130	25
			Beginning reading subscale	Baseline	141	25	130	25

					Intervention Group Analysis Sample		Control Group Analysis Sample	
Study	**RCT/ QED**	**Unit of Assignment**	**Outcome**	**Timing**	**N Children**	**N Clusters**	**N Children**	**N Clusters**
			Letter identification subscale	Baseline	143	25	129	25
			Writing total	Baseline	141	25	130	25
			Reading total	Posttest	143	25	130	25
			Beginning reading subscale	Posttest	141	25	129	25
			Letter identification subscale	Posttest	143	25	130	25
			Writing total	Posttest	141	25	127	25

Table 30, continued

					Intervention Group Analysis Sample		Control Group Analysis Sample	
Study	**RCT/ QED**	**Unit of Assignment**	**Outcome**	**Timing**	**N Children**	**N Clusters**	**N Children**	**N Clusters**
UNICEF Ethiopia	QED	School	Reading total	Baseline	51	20	80	17
			Beginning reading subscale	Baseline	49	20	73	17
			Letter identification subscale	Baseline	51	20	80	17
			Writing total	Baseline	51	20	80	17
			Reading total	Posttest	49	20	73	17
			Beginning reading subscale	Posttest	51	20	80	17
			Letter identification subscale	Posttest	50	20	78	17
			Writing total	Posttest	51	20	80	17
UNICEF Tajikistan	RCT	School	Reading total	Baseline	295	20	298	20
			Beginning reading subscale	Baseline	295	20	298	20
			Letter identification subscale	Baseline	295	20	298	20
			Writing total	Baseline	294	20	298	20
			Reading total	Posttest	295	20	298	20
			Beginning reading subscale	Posttest	295	20	298	20

					Intervention Group Analysis Sample		Control Group Analysis Sample	
Study	**RCT/ QED**	**Unit of Assignment**	**Outcome**	**Timing**	**N Children**	**N Clusters**	**N Children**	**N Clusters**
			Letter identification subscale	Posttest	295	20	298	20
			Writing total	Posttest	294	20	298	20
			Reading achievement	Grade 1	272	20	275	20
			Writing achievement	Grade 1	272	20	275	20
			Overall literacy achievement	Grade 1	272	20	275	20

Table 30, continued

					Intervention Group Analysis Sample		Control Group Analysis Sample	
Study	**RCT/ QED**	**Unit of Assignment**	**Outcome**	**Timing**	**N Children**	**N Clusters**	**N Children**	**N Clusters**
UNICEF Yemen	RCT	School	Letter identification subscale	Baseline	265	15	256	15
			Writing total	Baseline	265	15	256	15
			Letter identification subscale	Posttest	265	15	256	15
			Writing total	Posttest	265	15	256	15
			Reading achievement	Grade 1	245	15	186	15
			Writing achievement	Grade 1	244	15	186	15
			Overall literacy achievement	Grade 1	245	15	186	15

Table 31: Statistics for UNICEF Getting Ready for School: A Child-to-Child Approach Studies, Part II

Study	Outcome	Intervention Group Mean	Control Group Mean	Means Adjusted?	Treatment Group SD	Control Group SD	Statistical Test	Effect size	SE	ICC L2	ICC L3
UNICEF Bangladesh	Reading total (Baseline)	-0.12	0.07	No	1.00	1.00	3-level HLM (students/schools/sub-districts)	n/a		-1.36	n/r
	Beginning reading subscale (Baseline)	-0.13	0.07	No	1.00	1.00	3-level HLM (students/schools/sub-districts)	-n/a		-1.67	n/r
	Letter identification subscale (Baseline)	-0.12	0.07	No	1.00	1.00	3-level HLM (students/schools/sub-districts)	n/a		-1.46	n/r
	Writing total (Baseline)	-0.13	0.06	No	1.00	1.00	3-level HLM (students/schools/sub-districts)	n/a		-1.43	n/r
	Reading total (Posttest)	-0.13	0.11	No	0.87	1.09	3-level HLM (students/schools/sub-districts)	-0.24	0.07	-1.83	0.00

Study	Outcome	Intervention Group Mean	Control Group Mean	Means Adjusted?	Treatment Group SD	Control Group SD	Statistical Test	Effect size	SE	ICC L2	ICC L3
	Beginning reading subscale (Posttest)	-0.18	0.16	No	0.81	1.12	3-level HLM (students/schools/sub-districts)	-0.35	0.10	-3.00	0.00
	Letter identification subscale (Posttest)	-0.11	0.09	No	0.88	1.08	3-level HLM (students/schools/sub-districts)	-0.20	0.10	-1.58	0.00
	Writing total (Posttest)	0.14	-0.14	No	0.97	1.01	3-level HLM (students/schools/sub-districts)	0.28	0.10	4.11	0.00
	Reading achievement (Grade 1)	-0.07	0.09	No	1.03	0.97	3-level HLM (students/schools/sub-districts)	-0.16	0.10	-1.05	0.00
	Writing achievement (Grade 1)	0.00	0.02	No	0.92	1.06	3-level HLM (students/schools/sub-districts)	-0.02	0.10	0.00	0.00
	Overall literacy achievement (Grade 1)	-0.02	0.03	No	0.93	1.06	3-level HLM (students/schools/sub-districts)	-0.05	0.10	-0.44	0.01

Table 31, continued

Study	Outcome	Intervention Group Mean	Control Group Mean	Means Adjusted?	Treatment Group SD	Control Group SD	Statistical Test	Effect size	SE	ICC L2	ICC L3
UNICEF D. R. Congo	Reading total (Baseline)	0.10	0.10	No	1.00	1.00	2-level HLM (students/schools)	n/a		0.11	n/a
	Beginning reading subscale (Baseline)	0.17	0.17	No	1.00	1.00	2-level HLM (students/schools)	n/a		0.55	n/a
	Letter identification subscale (Baseline)	0.09	0.09	No	1.00	1.00	2-level HLM (students/schools)	n/a		0.06	n/a
	Writing total (Baseline)	0.00	0.00	No	1.00	1.00	2-level HLM (students/schools)	n/a		0.92	n/a
	Reading total (Posttest)	0.34	-0.32	No	1.05	0.85	2-level HLM (students/schools)	0.68	0.17	2.61	n/a
	Beginning reading subscale (Posttest)	0.13	-0.12	No	1.03	1.07	2-level HLM (students/schools)	0.24	0.17	1.12	n/a
	Letter identification subscale (Posttest)	0.35	-0.33	No	1.07	0.80	2-level HLM (students/schools)	0.71	0.17	2.67	n/a
	Writing total (Posttest)	0.31	-0.37	No	1.10	0.69	2-level HLM (students/schools)	0.73	0.17	3.44	n/a

Table 31, continued

Study	Outcome	Intervention Group Mean	Control Group Mean	Means Adjusted?	Treatment Group SD	Control Group SD	Statistical Test	Coefficient	SE	ICC L2	ICC L3
UNICEF Ethiopia	Reading total (Baseline)	0.04	0.42	No	1.00	1.00	2-level HLM (students/schools)	n/a		n/r	n/a
	Beginning reading subscale (Baseline)	0.07	0.12	No	1.00	1.00	2-level HLM (students/schools)	n/a		n/r	n/a
	Letter identification subscale (Baseline)	0.04	0.39	No	1.00	1.00	2-level HLM (students/schools)	n.a		n/r	n/a
	Writing total (Baseline)	-0.01	0.32	No	1.00	1.00	2-level HLM (students/schools)	n/a		n/r	n/a
	Reading total (Posttest)	0.15	-0.04	No	0.87	1.11	2-level HLM (students/schools)	0.18	0.21	0.41	n/a
	Beginning reading subscale (Posttest)	-0.23	0.08	No	0.71	1.20	2-level HLM (students/schools)	-0.30	0.20	0.21	n/a

Study	Outcome	Intervention Group Mean	Control Group Mean	Means Adjusted?	Treatment Group SD	Control Group SD	Statistical Test	Coefficient	SE	ICC L2	ICC L3
	Letter identification subscale (Posttest)	0.19	-0.06	No	0.90	1.10	2-level HLM (students/schools)	0.24	0.22	0.44	n/a
	Writing total (Posttest)	0.10	0.06	No	0.97	1.15	2-level HLM (students/schools)	0.04	0.20	0.37	n/a

Table 31, continued

Study	Outcome	Intervention Group Mean	Control Group Mean	Means Adjusted?	Treatment Group SD	Control Group SD	Statistical Test	Effect size	SE	ICC L2	ICC L3
UNICEF Tajikistan	Reading total (Baseline)	0.02	-0.01	No	1.00	1.00	2-level HLM (students/schools)	n/a		n/r	n/a
	Beginning reading subscale (Baseline)	0.03	-0.02	No	1.00	1.00	2-level HLM (students/schools)	n/a		n/r	n/a
	Letter identification subscale (Baseline)	0.02	-0.01	No	1.00	1.00	2-level HLM (students/schools)	n/a		n/r	n/a
	Writing total (Baseline)	0.01	-0.01	No	1.00	1.00	2-level HLM (students/schools)	n/a		n/r	n/a
	Reading total (Posttest)	0.04	0.00	No	1.00	0.96	2-level HLM (students/schools)	0.04	0.16	0.23	n/a
	Beginning reading subscale (Posttest)	0.03	0.00	No	0.99	0.99	2-level HLM (students/schools)	0.03	0.17	0.21	n/a
	Letter identification subscale (Posttest)	0.04	0.00	No	1.00	0.96	2-level HLM (students/schools)	0.04	0.17	0.22	n/a

Study	Outcome	Intervention Group Mean	Control Group Mean	Means Adjusted?	Treatment Group SD	Control Group SD	Statistical Test	Effect size	SE	ICC L2	ICC L3
	Writing total (Posttest)	0.02	-0.02	No	0.99	1.01	2-level HLM (students/schools)	0.04	0.17	0.23	n/a
	Reading achievement (Grade 1)	0.01	-0.01	No	1.03	0.98	2-level HLM (students/schools)	0.02	0.14	0.09	n/a
	Writing achievement (Grade 1)	0.03	-0.03	No	0.96	1.04	2-level HLM (students/schools)	0.06	0.10	0.00	n/a
	Overall literacy achievement (Grade 1)	0.01	-0.02	No	1.02	0.99	2-level HLM (students/schools)	0.03	0.14	0.09	n/a

Table 31, continued

Study	Outcome	Intervention Group Mean	Control Group Mean	Means Adjusted?	Treatment Group SD	Control Group SD	Statistical Test	Effect size	SE	ICC L2	ICC L3
UNICEF Yemen	Letter identification subscale (Baseline)	0.15	-0.12	No	1.00	1.00	2-level HLM (students/schools)	n/a		n/r	n/a
	Writing total (Baseline)	0.08	-0.04	No	1.00	1.00	2-level HLM (students/schools)	n/a		n/r	n/a
	Letter identification subscale (Posttest)	0.25	-0.12	No	1.01	0.98	2-level HLM (students/schools)	0.37	0.17	0.22	n/a
	Writing total (Posttest)	0.10	-0.06	No	1.05	0.97	2-level HLM (students/schools)	0.15	0.32	0.77	n/a
	Reading achievement (Grade 1)	0.22	-0.23	No	0.92	1.03	2-level HLM (students/schools)	0.46	0.120	0.31	n/a
	Writing achievement (Grade 1)	0.13	-0.11	No	0.90	1.06	2-level HLM (students/schools)	0.24	0.28	0.67	n/a
	Overall literacy achievement (Grade 1)	0.19	-0.19	No	0.91	1.04	2-level HLM (students/schools)	0.39	0.22	0.34	n/a

Table 32: Statistics for Read India

				Intervention Group Analysis Sample		Control Group Analysis Sample					
Study	**RTC/QED**	**Outcome**	**Timing**	**N Children**	**N Clusters**	**N Children**	**N Clusters**	**N Successful Intervention Group**	**N Successful Control Group**	**Proportion Successful Intervention Group**	**Proportion Successful Control Group**
Read India	Cluster RCT	Reads at least letters	Baseline	3,671	65	4,730	85	3,120	4,021	0.85	0.85
		Reads at least letters	Posttest	3,671	65	4,730	85	3,341	4,210	0.91	0.89
		Reads at least words or paragraphs	Baseline	3,671	65	4,730	85	2,313	2,980	0.63	0.63
		Reads at least words or paragraphs	Posttest	3,671	65	4,730	85	2,423	3,027	0.66	0.64
		Reads stories	Baseline	3,671	65	4,730	85	1,505	1,845	0.41	0.39
		Reads stories	Posttest	3,671	65	4,730	85	1,946	2,365	0.53	0.50

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