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Article

Designing and Implementing a Bilingual Early-Literacy Program in Indigenous Mexico Villages: Family, Child, and Classroom Outcomes*

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Abstract

Globally, there is great interest in enhancing young children's literacy development as a route to improving worldwide literacy. To contribute to this area of interest, this paper reports findings from a multi-pronged early-literacy program designed to improve the print-knowledge of young children in Yucatec Mayan villages. The school-based *Club de Lectura Solyluna* provided 16 culturally relevant bilingual (Spanish/Maya) children's books to caregivers during four workshops. The sample of 567 mothers and their preschool-aged children ($n = 567$) were enrolled in 28 preschool classrooms, which also received teacher trainings, children's books, and establishment of a school-based library. Outcomes were examined with respect to overall parent participation and uptake of workshop materials, features of the home-literacy environment, and children's gains in print knowledge in both Mayan and Spanish. The study findings show positive outcomes across all outcomes evaluated with the exception of growth in children's Mayan print-concepts skills. The program description and findings should be of relevance to efforts to implement early-literacy programming with indigenous villages in lower- and middle-income countries.

Keywords

Bilingual education • reading programs • indigenous • home literacy environment • shared reading

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An important dimension of children's early-literacy development is their emerging knowledge about print, referred to as print knowledge. Print knowledge represents children's developing understanding of the symbolic forms and functions of print, including knowledge of the orthographic structure of the written language they are acquiring and the relation between written and spoken language (Justice, Bowles, & Skibbe, 2006). Children who are reared in print-rich homes and communities often arrive to primary schooling with well-developed knowledge about print; for instance, they understand the distinction between written letters and words, they have a spoken vocabulary to discuss print forms and functions, and they know how to represent some features of their language's orthography (Fritjers, Barron, & Brunello, 2000; Justice & Ezell, 2001; Sénéchal, 2006). Importantly, children who have well-developed print knowledge at school entry have accelerated trajectories in learning to read relative to children with less-developed knowledge about print (Catts, Fey, Zhang, & Tomblin, 2001). While such evidence shows the correlations between early print knowledge and future reading achievement, causally interpretable studies also show that improving children's print knowledge in the pre-primary years results in improved reading achievement longitudinally (Piasta, Justice, McGinty, & Kaderavek, 2012). As a result of such work, there is great interest in identifying ways to improve young children's print knowledge in the pre-primary years as a means for improving their future reading outcomes.

Print knowledge is considered a "universal prerequisite" for reading development to occur (Bialystok & Luk, 2007), meaning that it is important universally across all of the world's written languages. Examining print knowledge among children learning alphabetic and Asian languages, Bialystok and Luk (2007) highlight similarities across languages in the emergence of print knowledge, arguing that children's knowledge about the symbolic functions of print is a foundation for reading across even very distinct languages. Given its universal importance, it is important to consider how to support the development of print knowledge in communities in which there are limited opportunities for children to acquire knowledge about the forms and functions of print in the pre-primary years.

The present work describes the results of a five-year effort to develop, pilot, and then start to scale-up a print-knowledge development program in indigenous, rural bilingual communities in Mexico's Yucatán peninsula. The peninsula's population across three Mexican states (Campeche, Quintana Roo, and Yucatán) is approximately 4,000,000, and an estimated one-fourth of these individuals speak the indigenous Yucatec Maya language and learn Spanish as a second (yet majority) language (National Institute of Statistics and Geography, 2020). Within Yucatán state, an estimated 72% of the population lives in poverty, and those in rural settings have approximately 50% of the income of those in urban settings, per Mexico's National Institute of Statistics and Geography (2020). National data concerning rural poverty indicates that the average household subsists on about 26,000 pesos annually (~\$1,300 USD). In the villages in which the present work was conducted, all within Yucatán state, many households are subsistence-based.

Although there is limited research concerning children's development in the Yucatec Maya context, Gaskins' (1999, 2000) qualitative examinations of the daily lives of young children in a traditional Mayan village in Yucatán state is an important exception. On the basis of extensive observations, Gaskins argues that children's activities in these contexts can be characterized using three principles: primary of adult work, importance of parental beliefs, and independence of child motivation. Briefly, she argues that the Yucatec Mayan household is structured around adult work and that children are expected to help or at least not disrupt it. As a result, children typically are not challenged cognitively or socially, as this can disrupt the family's economic production. Regarding parental beliefs, Gaskins notes that typical Yucatec Mayan parents believe that child development is "pre-programmed" and that they seldom provide experiences that would be designed to enhance their children's development. Finally, Gaskins asserts that parents do not

typically provide their children with direction on how to spend their time, and rarely seek to influence their behavior; as a corollary, she also notes that children rarely seek adults' attention. A more recent quantitative examination of caregiver talk to their toddlers in two Yucatec Mayan villages showed that these youngsters were talked to by adults far less than American children of the same age. Specifically, American children were directly addressed about 600 times in an hour as compared to about 100 times for the Yucatec Mayan children heard about 80 (Shneidman & Goldin-Meadow, 2012).

We might speculate that these characteristics of Yucatec Mayan households and adult-child interactions may hinder young children's development of print knowledge. Specifically, the available evidence indicates that caregivers play a key role in helping their children develop print knowledge by directly engaging them in literacy-related activities (Burgess, Hecht, & Lonigan, 2002). Further, it is also the case that in these communities, access to print is very scarce: the typical household owns zero or very few books, community libraries have few usable materials (often due to environmental conditions that degrade paper), and there are little to no books or magazines for sale in the local markets and stores (Dydia, Purtell, Justice, Pratt, & Hijlkema, 2019). In an effort to document children's access to print in rural indigenous villages in these villages, our team adapted Neuman and Celano's (2001) approach for examining children's access to print resources in four American neighborhood communities. Their approach involved walking the census boundaries of the neighborhood and counting the number of reading resources available in every store, documenting characteristics of all signage observed, and counting books available in child-care centers and public libraries. Replicating this approach in two Yucatec Maya villages (data unpublished), we found print resources to be limited to signage (e.g., mural for malaria prevention, street signs) with no access to reading resources in any store and children's books in community libraries very old, worn due to extreme humidity, and largely informational (e.g., a donated set of children's encyclopedias).

Potentially due to the limited direct instruction provided by parents (Gaskins, 2000) and the sheer scarcity of print resources, the available evidence suggests that children in Yucatán's Mayan villages have relatively limited print-related skills in either Maya or Spanish prior to entering primary school. Bengochea, Justice, and Hijlkema (2017) examined print knowledge for 84 4- to 5-year-old children in one small, rural indigenous village in Yucatán state, finding that children knew an average of about 3 Spanish letters and one Mayan letter ($SD = 3.7$ and 2.1 , respectively). Only 22% of children could point to the title of a storybook and 16% understood that print is different than pictures (Bengochea et al., 2017). By examining children's print knowledge in both Spanish and Maya, Bengochea et al. (2017) also showed a strong, positive cross-linguistic relation, such that children with more sophisticated print knowledge in Spanish also had more sophisticated print knowledge in Maya ($r_s = .4$ to $.57$).

Drawing from other efforts to improve children's early literacy skill via multi-printed efforts involving caregivers (Swain & Cara, 2017), and empirical evidence concerning the role of dual-language materials in bilingual programs (Hirst, Hannon, & Netbrown, 2010), our team conducted pilot fieldwork in which we developed eight culturally appropriate bilingual Maya-Spanish storybooks for children and distributed these via parent-focused workshops in three villages from 2013 to 2015. Titled *Club de Lectura Solyluna*, parents attended a series of four workshops held at their children's preschool over six months delivered by a local team. A total of 178 children and their parents participated. The primary focus of the pilot work was proof-of-concept for potentially scaling *Club de Lectura*, so as to determine the viability of developing and distributing bilingual children's storybooks via parent workshops. Our approach was based on research findings indicating that children's literacy skills can be fostered when their parents participate in workshops that teach specific methods to use in the home environment (e.g., Hannon, Morgan, &

Nutrbrown, 2006; Justice et al., 2011). Following this pilot period, we scaled *Club de Lectura* to reach a larger number of Yucatec Mayan communities, with the intent to reach 1,000 families with preschool-aged children. In program expansion, we also incorporated teacher trainings, in which we provided the collection of bilingual storybooks to children's teachers, provided information on how to use shared reading in the classroom, and established a lending library in children's schools.

In the present study, we examine results of *Club de Lectura Solyluna* with respect to a broad range of outcomes, including parents' participation in and satisfaction towards the *Club de Lectura* workshops, children's home-literacy environments, children's print knowledge, and the classroom literacy environment. In this work, no control group was included, therefore it is important to acknowledge that the study design does not allow causal interpretation. However, as the first study of which we are aware to examine effects of a program designed to improve print knowledge in Mexico's bilingual indigenous communities, the present results will be informative to future efforts to improve early literacy and reading achievement among this population. Indeed, the work presented here addresses three critical gaps in the extant literature. First, to what extent will Yucatec Mayan parents participate in a school-based literacy-focused program, and does participation influence the home-literacy environment? Second, to what extent does a school-based bilingual literacy-focused program influence children's print-knowledge development in Spanish and Maya? Third, to what extent does a school-based bilingual literacy-focused program influence literacy supports in children's classrooms? The present work is the first to address these questions in the Yucatec Mayan context.

Methods

The present study involved a pretest-posttest evaluation design, in which all participating parents and children were exposed to the school-based literacy program. In this section, we provide details of the participants, the instruments, and intervention program, the procedures, and data analyses.

Participants

Participants of relevance to this study include parents and children, as well as teachers. We describe each of these groups of participants in turn.

Parents and children. The present study included 567 mothers and their 567 preschool-aged children (47% boys). Children averaged 56 months of age ($SD = 10.43$ months) and ranged from 23 to 91 months. A parent questionnaire was completed at enrollment, which provided demographic information about the children and their families. Parents received oral support to complete the questionnaire by bilingual project staff when required. Per parent report, 43% of families had two adults living in the home, whereas 45% of families had three or more adults in the home and very few had only one adult in the home (2%), 10% were unreported. Twenty-eight percent of families had one child in the home, 22% had two children in the home, and 39% had three or more children in the home (11% unreported). Nearly one-half of families reporting speaking only Spanish in the home (46%), whereas 35% spoke both Spanish and Maya, and 9% spoke only Maya in the home (10% unreported). Eighty-five percent of mothers reported being able to read and write in Spanish, whereas 23% indicated they could read in Maya and 9% indicated that they could write in Maya. For their children, 89% of mothers indicated that their child could speak and understand Spanish, whereas 12% of mothers indicated that their child could speak Maya and 25% indicated that their child could understand Maya. The highest level of education obtained for most mothers and fathers was equivalent to middle school. The total household income per month was on average less than \$2,500 MXN per month (i.e., less than about \$140 USD per month).

Teachers. The children in this study were enrolled in 28 classrooms, and the teachers in these classrooms also participated in project activities. The majority of the teachers were female (89%, $n = 25$) and had graduated from a university (93%, $n = 26$). The teachers had an average of 12 years of experience teaching ($SD = 7.5$ years, Range = 1 to 29 years). Thirty-six percent of teachers indicated that they could speak Maya, and 46% indicated they could understand Maya. There were an average of 21 children in each classroom ($SD = 6.8$ children) and the length of the school day was relatively short (about three hours).

Instruments

Parent participation in workshops and uptake. Participation in workshops was measured using attendance logs maintained by research staff. Teacher participation was high due to affiliation of the project with their school, but participation by parents was expected to be variable and thus was carefully monitored. Participation was measured as the percentage of parents who attended each workshop and the percentage of parents who attended all of the workshops. Uptake of project content was of additional interest to determine whether parents read the club books at home between workshops and conducted other recommended activities. Uptake was measured using a brief questionnaire completed at the end of workshops 1, 2, and 3. Three parent-report items were designed to capture the frequency in which children interacted with the book club materials. Items included (i) how many times the child looked at the book club book alone or with an adult, (ii) used the materials in the book reading kit, and (iii) utilized the print materials from the workshop. The items were scored from zero to seven or more times. These items were summed to get an overall uptake score for each workshop. Cronbach's alpha ranged between .76 and .84.

Workshop and program satisfaction. As a measure of social valence for the *Club de Lectura*, the parent questionnaire collected after workshops 1, 2, and 3 also asked parents about whether they learned new ideas about their children's literacy development, if they read more at home, and if their child enjoyed the club books. These items were scored on a 10-point Likert scale from strongly disagree to strongly agree. Cronbach's alpha for these items ranged between .83 and .87, indicating high reliability. These items were summed for an overall workshop satisfaction score for each workshop. Overall satisfaction with the book club was assessed for both parents and teachers at the close of the club. Parents and teachers responded to three items on: (i) the main reasons they chose to participate in the book club, (ii) how satisfied they are with the program, and (iii) if they would recommend the book club to other families/teachers.

Home-literacy environment. The home-literacy environment of the participating children was assessed using a questionnaire collected at the start and end of the project which was designed to capture multiple aspects of the home environment. Eight items were adapted from Hammer, Miccio, and Wagstaff (2003) and Gonzalez and Uhing (2008). These studies examined the home-literacy environment of Latino families. These items asked how frequently families or children had participated in a given literacy activity during the past week on a scale from 0 to 7, with 0 indicating that they did not engage in that activity at all during the week and 7 indicating that they engaged in that activity 7 or more times. Three items were adapted from the *Parents' Literacy Habits Survey* (Farver, Xu, Eppe, & Lonigan, 2006). These items measured how often the children saw their mother and/or father reading for fun on a scale of 0 (*no times the past week*) to 7 (*seven or more times in the last week*). These items were summed for the final analyses. Cronbach's alpha for these items for pre-test was .89 and Cronbach's alpha for the post-test was .90. Five items assessed mothers' perceptions on barriers to reading with their child. These items were on a scale from 0 (*strongly disagree*) to 9 (*strongly agree*). These items were summed for the final analyses and Cronbach's alpha for pre- and post-test were .86 and .90 respectively. Finally, two items were included to capture family visits to the library in the last week and the number of children's books present in the home. For the library item,

responses were on an eight-point Likert scale from zero (*never*) to seven (*7 or more times*). For the children's books item, responses were on an eight-point Likert scale from zero (*0 books*) to seven (*36 or more books*).

Children's skills. Children completed a 20-min assessment battery at baseline and the conclusion of their participation, with an approximate 6-month span between assessments. The assessment was designed to capture children's print knowledge using several different measures of this construct included in the Spanish version of the *Phonological Awareness Literacy Screening-PreK* [PALS] (Ford & Invernizzi, 2009). Three subtests were administered: *Letter Names*, *Print and Word Awareness*, and *Name Writing*. For the *Letter Names* and *Print and Word Awareness* subtests, verbatim translations into Maya were created. For *Letter Names*, two charts representing 29 and 42 letters of the Spanish and Maya alphabet, respectively, were created. The charts depicted the letters in a fixed, random order. The assessor pointed to each letter and asked the child to name the letter first using one chart and then the other. Children's responses were scored as incorrect or correct (i.e., 0 or 1). For *Print and Word Awareness*, children were read a simple children's booklet *Tito Tito Colorito* in Spanish (Ford & Invernizzi 2009) and an adapted version of the story in Maya titled *Mukuy, Mukuy*, designed and back-translated by a Maya-Spanish bilingual staff member. The examiner reads the booklet to children and embeds ten queries about print (e.g., *Show me where to read on this page; Show me the title of this book*). For each version, children received a score between 0 and 10. Finally, for the *Name-Writing* task, children are asked to draw a picture of themselves and to sign it. This was only administered in Spanish. Children's name-writing representation was scored on a 0 to 7-point scale per the PALS manual, with increasing sophistication in orthography receiving gradually higher scores.

Classroom measures. Classroom literacy supports were measured using an observational measure adapted from the *Classroom Literacy Observation Profile* (Dydia et al., 2018) as well as a teacher-report questionnaire. The measures were administered at the start and close of the *Club de Lectura*. Items were organized to represent three different aspects of the classroom environment: *Classroom Materials*, *Child Activities*, and *Book-Reading Quality*. First, for *Classroom Materials*, eight items were used by an observer to examine the amount of books, writing paper and tools, letter or word puzzles, children's names, and displays of the alphabet, large print materials, and child-generated writing in the classroom. Each item was scored using a scale of zero to seven or more items present for a total possible score of 56. A summed score for pre- and post-test is used in the final analyses. Cronbach's alpha for pre- and post-test were .84 and .89, respectively. For *Child Activities*, teachers reported on how many times in the last week children in their classroom engaged in 10 different literacy activities, such as listening to books, writing their name, pretending to read, and acting out a story. The scale for these items was zero to seven or more times for a total possible score of 70. Cronbach's alphas for pre- and post-test were .80 and .90, respectively, and a total summed score was used in the analyses. Finally, for *Book-Reading Quality*, teachers reported their use of techniques during book reading using a subset of items from the *Preschool Literacy Survey* (Sandvik, van Daal, & Adèr, 2014). The assessment of book-reading quality included 16 items on how many times in the last week teachers asked children questions about the pictures, open-ended questions, questions about feelings in the books, or questions about how the books relate to the children's lives. Item scores could range from 0 to 7 (seven or more times) for a total possible score of 112. Cronbach's alpha for pre- and post-test were .92 and .95, which indicated very high reliability.

Procedure

This study was conducted in collaboration with six preschools located in four rural, traditional Yucatec Mayan villages in the Mexican state of Yucatán. The communities were located across the lower half of the state of Yucatán, south of Merida, the capital. The school administrators expressed an interest in

collaboration and a commitment to support all elements of *Club de Lectura Solyluna* over an approximate six-month period. All preschool teachers in these schools were invited to participate in club trainings and to provide informed consent. The parents of all children attending the preschool were also invited to participate. Project staff met with parents before and after school to provide information and collect informed consent. For parents with limited literacy skill, the consent agreement was read to them to ensure that they understood project requirements before consenting.

A three-person local team conducted all fieldwork for this project. All data collectors were Mexican citizens and residents of Yucatán, Mexico, who were affiliated with a local collaborating organization in Merida. The lead data collector was fluent in Maya and Spanish and was raised in an indigenous community similar to that in which project activities took place. The other two data collectors were Spanish-speaking. For parent questionnaires, project staff either collected or recorded responses on the questionnaires, identified the data, and later uploaded their responses to Qualtrics, an online survey platform. Project staff also completed the direct assessments with the children following protocols established by the project team. If the assessments were interrupted for any reason, the assessments were finished later in the assessment window.

Intervention Program

The book club *Club de Lectura Solyluna* consisted of four active ingredients which occurred over the span of about six months and culminated in a literacy celebration for the families, teachers, and school staff. The literacy celebration included book-sharing activities and a ribbon cutting for the opening of the new school library (the fourth ingredient of the Club).

The first ingredient was a collection of 16 bilingual books. Project staff, aided by local authors, poets, illustrators, and graphic artists, authored two sets of eight bilingual books. Each set was designed to span a range of topics, including Mayan folk tales, concept books, and narrative stories. The content and illustrations were heavily and iteratively vetted by the team to ensure cultural appropriateness of all content. Digital versions of the first eight books are currently available online for free download (<https://crane.osu.edu/our-work/solyluna-book-reading-club/>). This collection is among the only bilingual Maya/Spanish children's books available today.

The second active ingredient was the parent workshops. Parents, mostly mothers, participated in four workshops over an approximately four- to six-month period aimed at increasing families' understanding of early literacy and use of books in the home. Workshops for parents occurred directly at the end of the school day in a classroom at the school. Each workshop lasted approximately one hour, and children were welcome to participate alongside their parents, or to play freely in the school area. The workshop content, delivery approach, and supplemental materials (e.g., locally made puppets, art activities) were locally developed and delivered by two project staff with ongoing input from project staff with expertise in parent training and early literacy. The project staff were mothers with children attending an NGO school affiliated with this project (rather than research professionals) thus, to promote connections between workshop participants and the staff delivering them. The workshops were iteratively developed over the two-year project period, and the research literature was consulted for incorporation of evidence-based practices (e.g., Zucker, Justice, & Piasta, 2009). In each session, suggestions were provided to parents as to how to read the Club books with their children to develop specific skills, including print knowledge and vocabulary. Parents were provided with both of the book sets along with other print materials (e.g., writing materials, alphabet game, puppets) to support literacy in their homes, but no other incentives. Over the course of the workshops, parents worked with their children to write their own book and were provided

all the materials to do so although they were encouraged to incorporate materials from their personal lives/home.

The third active ingredient was the teacher workshops. Teachers participated in two workshops focused on the use of authentic literacy materials in their classrooms and sharing books with children, neither of which were customary practices in the participating schools. The teachers were also provided with both sets of bilingual books and encouraged to incorporate them into their daily curriculum.

The fourth active ingredient was establishment of a school library, which was opened in a literacy celebration when the *Club de Lectura* activities ended in a given school. Because extra space was very limited in all school settings, administrators had to agree at the start of the project to provide space for the libraries; in all cases, space in the school was re-allocated from a previous purpose (e.g., the administrator's office) to become the library. The library included 100 commercially available Spanish children's books, an infrastructure for displaying and storing the books (e.g., decorated milk crates hung on the wall), and soft flooring.

Data Analysis

The study had three primary aims. The first aim concerned the extent to which Yucatec Mayan parents would participate in a school-based literacy-focused program, and whether participation influences the home-literacy environment. To address this aim, we first calculated descriptive statistics regarding parents' participation, uptake, and satisfaction. In addition, we used paired samples *t*-tests to examine changes in the home-literacy environment from baseline to the final workshop. The second aim concerned the extent to which this school-based literacy-focused program would influence children's print-knowledge development in both Spanish and Maya. To address this aim, we used a one-way repeated-measures analysis of variance, with children's pretest and posttest scores on the dependent measures as factors. Finally, the third aim concerned the extent to which the school-based program influenced literacy supports available in children's classrooms. For this aim, we used paired-samples *t*-tests to examine change in classroom literacy supports from the start to the end of the program.

Results

Participation, Uptake, and Satisfaction

Participation. A total of 88% of families with children in the participating preschools chose to consent to participate in the book club. Of the families that consented, 81% participated in workshop 1, 78% participated in workshop 2, 68% participated in workshop 3, and 64% participated in workshop 4. Forty-one percent of families completed all workshops, whereas 70% of families participated in three or more workshops.

Uptake. Parent uptake was measured after workshops 1, 2, and 3. Based on the item-level data, parents indicated that the Club-related activity that children engaged in the most frequently was using the materials that came with the kit ($M = 4.35, 5.17, 5.30$, respectively). Parents indicated that their children looked at the book club books alone or with an adult about three to five times a week. However, there was considerable variability. The full range of responses (zero to seven or more times a week) was reported for each item after all of the workshops (except used materials that came with the kit after Workshop 3) and there were large standard deviations.

Table 1. *Parent report of workshop satisfaction*

<i>Satisfaction</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>Range</i>
Workshop 1	443	21.08	6.19	0-27
Workshop 2	396	21.04	6.57	0-27
Workshop 3	370	21.47	5.73	0-27

Note. Parents reported satisfaction after each workshop on a scale of 0 to 10 on three items, with higher scores (e.g., 10) corresponding to higher satisfaction. The three items are summed, with higher scores corresponding to higher satisfaction. Mean scores can range from 0 to 30.

Satisfaction. Parents reported satisfaction in two ways: satisfaction after each workshop (for workshops 1 to 3) and overall satisfaction with the book club at the end of the program (see Table 1). For satisfaction after each workshop, parents reported that they generally felt they learned new things about their children's literacy development, they tried to read more at home, and that their children enjoyed the club book. For overall parent satisfaction, a majority of parents indicated: (i) that they joined the book club to learn how to teach their child (86%), (ii) that they were very satisfied with the book club (82%), and (iii) that they would recommend the book club to other families (99%). See Table 2 for descriptive on overall satisfaction.

Table 2. *Parent report of overall satisfaction at club completion*

<i>Item</i>	<i>n (%)</i>
What are the main reasons that you participated in the book club? (<i>n</i> = 353)	
For the materials and books	38 (11%)
To learn about literacy	63 (18%)
To learn to teach my child	304 (86%)
To get to know my child's teachers	12 (3%)
To spend time with my child	124 (35%)
For the literacy celebration	3 (1%)
I felt obligated	0 (0%)
Other	9 (2%)
How satisfied are you with the book club? (<i>n</i> = 357)	
Very satisfied	293 (82%)
Satisfied	56 (15%)
Indifferent	2 (1%)
Unsatisfied	0 (0%)
Very unsatisfied	6 (2%)
Would you recommend the book club to other families? (<i>n</i> = 359)	
Yes	356 (99%)
No	3 (1%)

Teachers reported overall satisfaction at the end of the book club as well. Results indicated that the majority of teachers participated in the book club to learn about literacy and to learn new ways to teach. A majority of teachers were very satisfied with the book club (81%) and would recommend the book club to other teachers (100%). See Table 3 for full descriptive.

Table 3. *Teacher report of overall satisfaction*

<i>Item</i>	<i>n (%)</i>
What are the main reasons that you participated in the book club? (<i>n</i> = 27)	
For the materials and books	5 (18%)
To learn about literacy	22 (79%)
To learn new ways to teach	20 (71%)
To get to know my colleagues	0 (0%)
To spend time with my colleagues	0 (0%)
For the literacy celebration	0 (0%)
I felt obligated	0 (0%)
Other	0 (0%)
How satisfied are you with the book club? (<i>n</i> = 27)	
Very satisfied	22 (81%)
Satisfied	5 (19%)
Indifferent	0 (0%)
Unsatisfied	0 (0%)
Very unsatisfied	0 (0%)
Would you recommend the book club to other families? (<i>n</i> = 27)	
Yes	27 (100%)
No	0 (0%)

Change in the Home-Literacy Environment

Descriptive results of the home-literacy environment showed that parents reported engaging in about five literacy activities in the past week before participation in the book club. After participation in the book club, this increased to about seven literacy activities in the past week. When examining the pre-test descriptive for each item regarding parent report of barriers to reading, the mean for pre-test was 16.79 and the mean at post-test was 17.03. During pretest, parents reported taking their child to library about one time a week, whereas after the book club they reported taking their child to the library an average of one to two times a week. Finally, before the book club, for how many children's books were in the home, parents responded with an average of 1.63 on the Likert scale. This corresponds to between one to 10 books in the home. After participation in the book club parents response on the Likert scale increased to 2.06, which corresponds to six to 10 books. Results indicated that after participation in the book club, parents reported significantly more literacy activities ($ds = .98$), use of the library ($ds = .25$), and children's books in the home ($ds = .42$). There was not a significant change in parent-reported barriers to reading. See Table 4 for full results.

Table 4. *Change in home-literacy environment*

<i>Measure</i>	<i>Pre-Test</i>				<i>Post-Test</i>				<i>t</i>	<i>p</i>	<i>d</i>
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>Range</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>Range</i>			
Literacy activities	509	32.83	14.97	2-73	370	48.53	14.60	8-77	-18.14	.001	.98
Barriers to reading	504	16.79	13.85	0-45	366	17.03	14.62	0-45	0.37	.715	.02
Library use	387	0.98	1.42	0-7	283	1.56	1.72	0-7	-3.97	.001	.25
Children's books	498	1.63	1.39	0-7	363	2.06	1.45	0-7	-7.51	.001	.42

Note. Pre/post statistical comparisons based on cases for which both pretest and posttest were available.

To examine the change in the home-literacy environment after participation in the book club, we completed a series of paired-sample *t*-tests. Results indicated that after participation in the book club, parents reported significantly more *Literacy activities*, *Library use*, and *Children's books* in the home. In addition, calculate of effect-size estimates using Cohen's *d* indicates that these effects were medium to large in size

($d_s = 1.06, 0.37,$ and 0.4 respectively). There was not a significant change in parent-reported *Barriers to reading*.

Change in Children's Emergent-Literacy Skills

Table 5 provides the descriptive data for children's pre- and post-test performance on the *Print-knowledge* measures in Spanish and Maya. To investigate changes in the children's print knowledge after participating in *Club de Lectura*, we conducted paired-sample *t*-tests. Results indicated that children had significantly higher scores on *Spanish letters, Maya letters, Spanish print and word awareness, and Name writing* after participation in the club, as shown in Table 5.

Table 5. *Change in children's print knowledge*

Measure	Pre-Test				Post-Test				<i>t</i>	<i>p</i>	<i>d</i>
	<i>n</i>	<i>M</i>	<i>SD</i>	Range	<i>n</i>	<i>M</i>	<i>SD</i>	Range			
Spanish letter names	458	3.67	5.57	0-27	445	5.63	6.65	0-28	-11.62	.001	.57
Maya letter name	458	0.63	2.26	0-19	445	0.956	2.72	0-18	-2.46	.014	.12
Spanish print and word	458	4.30	2.46	0-10	445	5.30	2.30	0-10	-8.17	.001	.41
Maya print and word	458	0.53	1.48	0-8	445	0.70	1.72	0-10	-1.17	.243	.06
Name writing	458	3.77	2.49	0-7	445	4.60	2.45	0-7	-9.32	.001	.47

Note: Pre/post statistical comparisons based on cases for which both pretest and posttest were available.

Change in Children's Classrooms

Table 6 shows pre- and posttest findings of the literacy supports available in children's classrooms. To examine whether there were significant changes in teachers' classroom materials, child activities, and book-reading quality, we completed three paired-sample *t*-tests.

Table 6. *Classroom literacy resources at pre-test and post-test*

Measure	Pre-Test			Post-Test			<i>t</i>	<i>p</i>	<i>d</i>
	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range			
Classroom materials	11.59	5.89	2-27	15.00	7.04	2-32	-3.38	.002	.66
Child activities	34.04	8.63	15-48	39.70	10.23	21-56	-3.00	.006	.58
Book-reading quality	57.00	13.27	20-81	64.41	13.99	47-90	-3.39	.002	.65

Note: Pre/post statistical comparisons based on cases for which both pretest and posttest were available.

Results of these analyses indicated that teachers had significantly increased the amount of literacy materials in their classrooms and reported use of book-reading techniques used over the previous week. Also, teachers reported a significant increase in children's literacy activities in the classroom.

Discussion

The research presented here is the first of which we are aware to examine the use of school-based early-literacy programming via the *Club de Lectura Solyluna* with Yucatec Maya parents and their preschool-aged children. While the programming approach builds on decades of research on efficacious early-literacy programming, such as provision of storybooks and parent workshops (e.g., Hannon et al., 2006; Jordan, Snow, & Porche, 2000; Swain & Cara, 2017), it was unknown whether this type of programming could be implemented successfully in this particular context. As discussed in the introductory content, adult work is primary in Mayan indigenous villages, parents seldom directly teach their children

(Gaskins, 2000), and print resources are scarce. Therefore, it was important to test whether Yucatec Mayan parents would participate in ongoing workshops focused on teaching their children early-literacy skills and provision of storybooks for use in the home. Given the large sample size ($n = 567$) and high level of subscription by eligible parents (88%) into *Club de Lectura*, we contend that the present study provides evidence that such programming should be further developed across the peninsula as a means to improve literacy levels and children's access to print resources early in their lives.

We highlight here several key findings and their implications. First, although we lost some parents over time to attrition, 70% of parents completed at least three of the workshops, which we interpret as relatively high maintenance of families over time. A study of school-based family-literacy programming in the UK reported a loss of 34% of parents (Swain & Cara, 2017) over the program. Some characteristics of the participating communities and the *Club de Lectura* program likely helped to maintain relatively high participation rates, even though the participating families live in relatively deep poverty and have many constraints on their lives, including home-based economic production. First, families within the involved Yucatec Mayan communities are relatively stable, in that they are not moving from or leaving the village often. Thus, the population of interest is relatively stable. Second, sessions were conducted at children's schools, and parents walk their children to and from the school each day. With the workshops offered at the close of the school day, parents were not inconvenienced. Third, parents received children's storybooks at each session, which may have served as an incentive.

However, we should point out that the majority of parent participants reported participating in workshops so that they could "learn to teach my child". In this regard, participation rates may have been high because parents were motivated by the content and want to develop their self-efficacy. This runs counter to qualitative evidence on Yucatec Mayan families suggesting that parents may not want to directly teach their children (Gaskins, 2000). This finding warrants additional exploration in future research, as it may suggest that Mayan parents are invested in directly teaching their children and desire more tools for doing so.

Second, although we did not use a causally interpretable research design, we saw significant changes in the home-literacy environment and children's print-knowledge skills during families' participation in *Club de Lectura*. Specifically, over the approximate 6-month period of club participation, parent report of the frequency of home-literacy activities increased significantly, with the effect size large in magnitude; lesser but still positive effects were seen for library use and children's books in the home. Importantly, these results are coherent with similarly designed programs implemented in different cultural settings. For instance, in a school-based family-literacy program implemented in the UK, families had a higher volume of many home-literacy activities with their young children (Swain & Cara, 2017). It is quite interesting to note that such programs can be effectively implemented in such disparate settings.

Of additional note is the observed changes in children's skills, with children showing significant improvements in knowledge of Spanish letter names, Maya letter names, Spanish word and print concepts, and name writing. Whether these can be attributed causally to *Club de Lectura* needs to be determined in future work; however, it is desirable to see changes in these important skills over the project period. Of further interest is that children did not significantly improve in their knowledge of Maya print and word concepts. This is surprising given that the 16 club storybooks were prepared as bilingual versions, in part to ensure that children be exposed to the indigenous language of their villages (Yucatec Maya) even as they are exposed to the predominantly Spanish curriculum and instruction used in preschools. This stated, the descriptive data suggested that not all families spoke Mayan in the home, and many parents reported that their children did not speak Maya. As some experts have reported, there is evidence of language loss for

Yucatec Maya due in part to children in these speech communities are no longer learning this language (England, 2003). With only 25% of the children in this sample reportedly comprehending Maya, it may be that their parents used only the Spanish text in the books.

Finally, it is important to highlight the social valence of the *Club de Lectura* in terms of relatively high participation rates and reports of satisfaction among the participating families. This work reached over 500 families in four rural villages, and 97% reported that they were satisfied or highly satisfied with the program and 99% indicated that they would recommend the club to others. While there is relatively little known about Yucatec Mayan families with respect to their early-literacy practices, and print materials are very scarce, this study supports investing in Yucatec Mayan parents to enhance their parenting role. There is strong evidence that parents can play a critical role in supporting their young children's early-literacy development (Burgess et al., 2002; Justice et al., 2011) and family-literacy programming is an important means for empowering parents to do so (Jordan et al., 2000). The little available evidence on Yucatec Mayan parents could be used to argue that such programming might not fit within the Mayan community: adult work is primary, children can develop on their own, and parents don't often speak directly to their children (Gaskins, 1999, 2000; Schneidman & Goldin-Meadow, 2012). However, the present work finds that Yucatec Mayan parents will readily subscribe to opportunities to enhance their children's early development which, at least tentatively, may lead to improvements in the home-literacy environment and children's literacy development.

Several limitations and future directions for research should be highlighted. Limitations of note include the lack of experimental design, the use of survey methods to assess the home-learning environment, and the potential lack of generalizability of these results to other settings. Future directions for research could building on these limitations. First, experimental research in this context would be extremely valuable for determining causal effects of such programs on children and families. The use of direct observations of home-learning environments would provide a decidedly more valid account of children's experiences in their homes and exposure to learning opportunities. Finally, it is important that work such as this be replicated in other contexts in which literacy programming is needed. It is not clear that a program build within the Yucatec Mayan context would be effective in other indigenous settings, and this should be studied in future work.

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