A Pilot Randomized Wait-list Controlled Trial of an Online Family Literacy and Wellness Program for Latino Dual Language Learners

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Abstract

Background: Early childhood interventions can simultaneously promote positive health and early language experiences, but often implementation and equity receive insufficient attention in the development process.

Objective: We applied a health equity lens to refine and pilot test a family literacy and wellness program designed for Latino dual language learners (DLL) entering Kindergarten and their caregivers.

Methods: In collaboration with a parent and community advisory board, we refined an 8-week family literacy and wellness program and conducted a pilot randomized controlled trial with wait list control. The program was specifically designed by our interprofessional team for Latino DLLs and uses health topics (i.e., nutrition, physical activity, sleep, and social-emotional development) to (1) introduce foundational language and literacy skills to children, (2) empower families to engage in health and home literacy activities using a strengths-based approach, and (3) encourage maintenance of families' home language. We assessed reach collecting socio-demographic information, feasibility by measuring attendance, acceptability using a parent survey, and preliminary effects on home literacy activities assessed with a validated parent-report instrument (StimQ2 quantity, quality, content, and concepts subdomains) and child literacy skills using investigator-developed assessments. We analyzed quantitative data using descriptive statistics and regression analyses.

Results: Parents and community advisors informed program content. Thirty-two parent-child dyads enrolled in the pilot RCT. All parents identified as Latino; 91% reported limited English proficiency; one-fifth had less than 8th grade education, indicating that we reached the intended audience. Parents rated the program as highly acceptable, and 72% of participants attended ? half of the sessions. After participation, group 1 had higher scores on StimQ2 quality scores (Effect size (ES) 0.99; p=0.02) and higher quantity scores (ES=1.01; p=0.04) compared to group 2.

Conclusions: Similar interprofessional collaborations could be a promising strategy to promote equity in early language experiences for Latino dual language learners and their families. Clinical Trial: ClinicalTrials.gov NCT05339464

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Conclusions: Similar interprofessional collaborations could be a promising strategy to promote equity in early language experiences for Latino dual language learners and their families.

Trial registration: ClinicalTrials.gov NCT05339464

Key words: pediatrics; child development; health equity; Latino; dual language learner

Introduction

Social drivers of health (SDOH) underlie inequities in access to health promoting services and negative health outcomes that are endured by historically marginalized populations. [1] Increasingly, healthcare organizations are developing interventions to address SDOH, such as screening and intervention for needs like food and housing insecurity. [2, 3] Education is an upstream SDOH that is critically important for health and wellbeing, but it has received insufficient attention in healthcare settings. [4] Kindergarten performance strongly predicts health risk behaviors and markers of wellbeing such as college education. [5, 6, 7] As a result, inequities in kindergarten readiness threaten long-term health and wellbeing at the individual and population levels. [8, 9] Latino dual language learners (DLL) are a rapidly growing segment of the population [9] who experience pervasive inequities in school readiness that predispose them to poor educational, occupational, and health outcomes. [4, 10, 11, 12] Thus, sustainable interventions to support this population are urgently needed.

Pediatric clinicians are in a unique position to implement early childhood interventions that promote optimal school readiness given their near-universal access to young children, frequent contact with families, and opportunities to build and leverage strong parent-clinician relationships. [13, 14] Importantly, early childhood interventions can simultaneously promote physical and academic school readiness; interventions focused on family literacy offer a clear example. Family literacy can be defined as the way families use literacy in their homes and community including during typical routines. [15, 16, 17] Families already engage in a wide range of literacy activities that are present in many health routines (e.g., reading food labels). Embedding these practices in family literacy programs

may provide a more ecologically valid intervention, that is rooted in existing rather than new practices and acknowledges cultural diversity. Yet, few early childhood interventions take advantage of these opportunities. The Food for Thought program is a notable exception. [18] This program uses culturally sensitive typical family food routines to support child language and literacy skills such as vocabulary, decoding, and writing. [18] Programs can use such an approach to engage families and build cross-sector partnerships between pediatric professionals and educators that find synergy in their expertise. Despite their potential to promote equity through family engagement, such cross-sector partnerships are rare.

Implementation often receives insufficient attention early during the development of health promotion interventions. [14] This is important since limited understanding of community context and partner priorities can potentially diminish and even eliminate an intervention's impact. [19] Baumann and Cabassa identified important elements that could facilitate an equity lens in implementation studies early in the intervention development process including focusing on reach from the beginning and designing interventions for historically marginalized populations in mind. [19] Partnered approaches from the earliest stages of intervention design and refinement can help promote health equity, but rarely occurs. To our knowledge, few early child interventions have leveraged this approach.

To address these gaps, we engaged implementation science applying a health equity lens to refine and pilot test an online family literacy and wellness program designed for Latino DLLs entering Kindergarten and their families. Using community-engaged research strategies, we partnered with parents to refine the program and then conducted a pilot randomized controlled trial (RCT). Consistent with the approach proposed by Baumann and Cabassa, we intentionally focused on intervention reach, design, and equity relevant implementation outcomes, which can inform similar cross-sector education healthcare partnerships that seek to promote equity for Latino DLLs and their families. [19]

Methods

Study design, ethics, and registration

We conducted a pilot study using an RCT with waitlist control design. The Rutgers Health Institutional Review Board approved this study. All participants provided informed consent. The study was registered prior to enrollment of the first participant at Clinicaltrials.gov, Identifier NCT05339464.

Study population and setting

We recruited Latino DLLs (age 4-6 years old) and their parents from Eric B. Chandler Health Center, a local Federally Qualified Health Center, and the surrounding greater New Brunswick area. Eric B. Chandler Health Center largely serves Latino individuals from under-resourced communities. Clinicians at Eric B. Chandler Health Center referred potentially eligible participants to the study team. We also advertised the study with our local community partners using recruitment flyers and word of mouth. Eligibility criteria included primary caregivers age ≥18 years (referred to as parent for the remainder of this article) of children entering kindergarten who identified as Latino, used Spanish at home, owned a cellphone, and were willing to receive text messages and be randomized. We excluded children with multiple anomalies or genetic disorders and previously identified developmental delays.

Program refinement

We partnered with our parent advisory board through a series of community engagement studios that helped refine the program throughout the project.[20] The parent advisory board consists of parents who participated in past iterations of the family literacy and wellness program. All parents identify as Latino and identify Spanish as their preferred language for communication. Their children were in kindergarten, 1st grade, or 2nd grade respectively, which offered a range of scholastic experience and

perspectives on their child's needs. We conducted 7 community engagement studios with our parent advisory board from January 6th, 2021- January 30th, 2023. We adapted the community engagement studio concept from the approach developed by the Meharry-Vanderbilt Community Engaged Research Core [20] to facilitate meaningful participation and engagement. Each studio focused on a specific aspect of the program. Bilingual team members presented relevant information on the program and then a bilingual research coordinator facilitated dialogue to elicit parents' feedback on the content and procedures. Through this process parent advisors provided substantive input on the program's mission, the intervention content, and logistics. The project also has a community advisory board made up of local community leaders including educators, a pediatrician, a librarian, and community health expert that meets regularly to advise the team on outreach and engagement strategies as well as program content.

Study conditions

All parent-child dyads participated in the family literacy and wellness program. Parent-child dyads were enrolled and randomized 1:1 to the first group (June-July) or to the second group (July-August). Participants in both groups received a bookbag with school supplies, an activity kit, and program books at enrollment. The program was specifically designed by our interdisciplinary team (i.e., education, linguistics, and pediatrics) for Latino DLLs using health topics (i.e., nutrition, physical activity, sleep, and social-emotional development) to (1) introduce foundational language and literacy skills to children, (2) empower families to engage in health and home literacy activities using a strengths-based approach, and (3) encourage maintenance of families' home language and cultural traditions. [21, 22] We first offered the program in person at Eric B. Chandler Health Center in 2019. [22] This initial iteration established the program structure, which included (1) 8-parent-child workshops, (2) take-home kits including bookbag with school supplies, activity kit, and program books to support at-home extension activities that reinforced session content, and (3) reminder text messages

that reinforced in-class content. [22] In 2020, in response to the COVID-19 pandemic, the workshops shifted to an online format via video-conferencing software. [21] We continued the virtual format for the 8 parent-child workshops, which we refined, and then pilot tested in this study.

Data collection

Trained bilingual research assistants collected data online via secure video conference software at enrollment (study visit 1), approximately two-months post enrollment, after group 1 completed the program and prior to the start of group 2 (study visit 2), and approximately four-months post-enrollment, after group 2 completed the program (study visit 3). In this manuscript, we focus on between-group differences in parent literacy and language activities and child outcomes during study visit 2, which represents the timepoint after group 1 had completed the program and before group 2 had started it.

Implementation outcomes

Reach

We examined demographic characteristics of parent-child dyads including ethnicity, parent education, and English proficiency to assess to what extent the program reached the intended audience.

Engagement

We assessed engagement by measuring attendance.

Acceptability

We assessed acceptability by examining survey responses to the Acceptability of Intervention Measure (AIM), [23] a 4-item validated assessment of program acceptability.

Parenting and child outcomes

Parenting outcomes

The StimQ2 is a validated parent-report assessment of the home cognitive environment that is available in English and Spanish.[24] We used the StimQ$_2$ Read scale to explore the effects of the program on parent home literacy activities with subdomains that focus on quantity, quality, content, and concepts. We used the StimQ$_2$ Parent Verbal Responsivity (PVR) scale to explore verbal responsivity during parent child interactions.

Child outcomes

We used investigator-developed assessments to explore the effect of the program on child outcomes. The assessments focused on letter identification, letter-sound knowledge, vocabulary, and book awareness. In these tasks, children were asked to identify the letters, associated letter sounds, and vocabulary words that were covered during online workshops. The children were also asked to identify different parts of children's books (e.g., book cover, title page).

Data Analysis

We first calculated means and standard deviations or percentages for continuous or categorical variables to examine reach using sociodemographic information, engagement using attendance logs, and acceptability using the AIM survey responses. We then used regression models to explore between group differences in home literacy activities using StimQ$_2$ Read scale total score and quantity, quality, diversity of concepts, and diversity of content subdomains, responsive verbal interactions using StimQ$_2$ PVR, and child literacy skills using investigator-developed assessments focused on letter identification, letter-sound knowledge, vocabulary, and book awareness. We adjusted for the following covariates that we identified as important *a priori:* baseline scores, child

age, child language, and parent education. For comparison across outcomes, we calculated effect size estimates by dividing the treatment coefficient estimate from regression models by the residual standard deviation of each outcome.

Results

Program refinement

The parent advisory board helped shape the program's content and logistics. Based on their experience with the program, parents provided specific feedback that helped determine the length of sessions, program duration, and the best dates and times to offer the online sessions. During the meetings, parents also offered feedback that informed changes related to instructional pace, use of materials, and routines for parent-child interactions. Some considerations included whether the materials were easy to read and use at home. Families found the at-home extension activities to be enjoyable and identified them as a strength. Parents also found that the school supplies sent home in the backpack, would be useful in their home learning environment.

Pilot study

Fifty-four parent-child dyads expressed initial interest in participation; seven of these parent-child dyads did not meet the inclusion criteria and nine declined to participate. The most common reason for declining was not having interest in participating. We randomized thirty-four parent-child dyads (Figure1). Two parent-child dyads were later excluded for not meeting eligibility criteria resulting in a final enrolled group of thirty-two dyads. There were five parent-dyad groups that were lost to follow up. Additionally, two parent-child pairs discontinued participation.

Reach

Demographic characteristics are summarized in Table 1. All participants identified as Latino. Fifty-

three percent were of Mexican origin; 91% reported limited English proficiency. Fifty-three percent did not achieve a high school diploma. On enrollment, children were 4.5 years old on average; Sixty-two percent of children were identified as speaking Spanish like a native Spanish speaker. These characteristics suggest that the program reached the intended audience.

Engagement

Program attendance is summarized in Figure 2. Seventy-two percent of parents attended at least half of the sessions. Timing was an important consideration for attendance with lower attendance in the second half of the summer. Some families reported travel outside of the country and/or taking on additional seasonal work during the latter part of the summer.

Acceptability

On average, parents agreed that the program met their approval, it was appealing, they liked the program, and they welcomed what they learned (Table 2).

Parenting outcomes

Results of the $StimQ_2$ Read and PVR scales are presented in Table 3. While not statistically significant there was a moderate difference between Group 1 (i.e., those who had completed the program) and Group 2 (i.e., those who were waiting to begin) on the total $StimQ_2$ Read scale (Cohen's D: 0.55; p=0.23). There were large statistically significant differences between Group 1 and 2 on the quantity and quality subdomains (Cohen's D= 1.01; p=0.04 and Cohen's D=0.99; p=0.02). The between-group difference on the PVR was small and not statistically significant.

Child outcomes

Child outcomes are summarized in Table 4. The between-group differences on letter identification, letter-sound knowledge, and vocabulary were either very small or in the unexpected direction. For book awareness, we found a moderate-to-large effect (Cohen's D=0.82; p=0.11) that was not statistically significant.

Discussion

In this study, we refined an online family literacy and wellness program with parent feedback, and during pilot testing, we found that the program reached and engaged Latino DLLs and their families. We also identified promising patterns in parent home literacy activities after participation. The intentional involvement of families and other partners in the research process, and focus on reach and other early implementation outcomes provided valuable insight into how to apply a health equity lens to this early childhood intervention. These findings can inform interdisciplinary teams that seek to build cross-sector collaborations and overcome siloed approaches to equity promotion.

All caregivers in our sample identified as Latino and >90% reported limited English proficiency, suggesting that the program reached the intended audience. We designed the family literacy and wellness program to address the populations' specific needs and take into consideration their linguistic and ethnic backgrounds. First, our program is bilingual, supporting both children's skills and parents' linguistic preferences. The focus on families from Latino backgrounds encompassed not only the language of implementation, but also the cultural aspects embedded in the program. Meta analyses support that family literacy programs increase parent literacy activities and improve child emergent literacy. [25, 26] However, low participation and engagement among Latino parents from under-resourced communities have been major weaknesses. [27] Time demands (e.g. work), lack of childcare for siblings, and schedule incompatibility are commonly cited barriers but there are other modifiable program design weaknesses. [18, 27] First, similar programs have been criticized for taking a

deficit approach and imposing dominant cultural activities on families without building on their unique strengths. [28, 29] Such approaches do not take into account parents' past experiences with activities like reading which may be negative. [30] Second, while bilingual programs are emerging, most do not build on families' heritage language, a major issue for parents with limited English proficiency. [31-34] Third, there is a paucity of studies focused on engagement with Latino families from under-resourced communities. [18] By engaging parents as partners throughout the research process and refining the program based on their feedback, we were able to overcome many of these barriers, and reach the intended audience with high attendance levels.

Consistent with previous work, we found that an online family literacy and wellness program was well attended and highly acceptable to families. [13, 19, 20] The current study extends our previous work by demonstrating promising patterns in both the quantity and quality of home literacy activities. While we did not identify differences in letter identification, letter-sound knowledge, and vocabulary, it is possible that 8 weeks is not sufficient time to detect these diffences. Although, not statistically significant, the moderate to large effect on book awareness fits with enhanced quantity and quality of home literacy activities. One possibility is that by increasing parent literacy activites the summer before Kindergarten, improvements in child outcomes may be observed later. Future studies will need to follow children for a longer period of time to test this hypothesis, an issue that we are currently addressing in our ongoing work.

This work is subject to certain limitations. First, while pervasive inequities in school readiness and wellness serve as strong rationale for focusing on Latino DLLs and their families, our findings may not generalize to all settings and other populations. Future work is needed to tailor program content for participants from other racial and ethnic backgrounds. Second, since this was a pilot study, it is possible that statitical analyses did not have adequate power to detect differences in parent and child

outcomes that could be meaningful. We are addressing this limitation in our ongoing work. Third, we relied on parent-report measures for home literacy activities and health routines, which could be subject to recall bias and social desirability. Future work should incorporate observational measures to help address this limitation.

Conclusion

We found that a family literacy and wellness program designed for Latino DLLs reached the intended audience, engaged participants, and we identified promising patterns in home literacy activities. While additional work is needed to definitively test the program's effects and identify optimal implementation strategies, the findings suggest such interdisciplinary collaborations could be a promising strategy to promote equity in children's early language experiences.

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Conflict of interest disclosure

The authors have no conflicts of interest to disclose. This work or portions of this work have not been presented or published elsewhere.

Abbreviations

AIM: Acceptability of intervention measure

DLL: Dual language learners

PVR: Parent Verbal Responsivity

RCT: Randomized controlled trial

SDOH: Social drivers of health

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Table 1: Demographic information of study participants at enrollment

	Total n=32	Group 1 n= 15	Group 2 n=17
Mean child age, years (standard deviation (SD))	4.5 (0.5)	4.6 (0.5)	4.5 (0.5)
Child sex			
Male	17 (53.1%)	7 (46.7%)	10 (58.8%)
Female	15 (46.9%)	8 (53.3%)	7 (41.2%)
Child's ability to speak Spanish			
Speaks like a native speaker	20 (62.5%)	7 (46.7%)	13 (76.5%)
Almost like a native speaker	6 (18.8%)	4 (26.7%)	2 (11.8%)
Difficulty speaking it	5 (15.6%)	3 (20.0%)	2 (11.8%)
Barely speaks it	1 (3.1%)	1 (6.7%)	0 (0%)
Child's ability to understand Spanish			
Understands it like a native speaker	22 (68.8%)	9 (60.0%)	13 (76.5%)
Understands it for the most part	5 (15.6%)	3 (20.0%)	2 (11.8%)
Difficulty understanding it	3 (9.4%)	2 (13.3%)	1 (5.9%)
Barely understands it	2 (6.3%)	1 (6.7%)	1 (5.9%)
Preschool attendance			
Beginning at age 3	19 (59.4%)	10 (66.7%)	9 (52.9%)
Beginning at age 4	9 (28.1%)	4 (26.7%)	5 (29.4%)
Never attended	4 (12.5%)	1 (6.7%)	3 (17.7%)
Parent's age (years)			
21-25	5 (15.6%)	3 (20.0%)	2 (11.8%)
26-30	5 (15.6%)	2 (13.3%)	3 (17.7%)
31-40	22 (68.8%)	10 (66.7%)	12 (70.6%)
Parent's country of birth			
Mexico	16 (53.3%)	7 (53.9%)	9 (52.9%)
Honduras	5 (16.7%)	3 (23.1%)	2 (11.8%)
Other	9 (30.0%)	3 (23.1%)	6 (35.3%)
Parent-reported English proficiency [1]			
Very well	3 (9.4%)	2 (13.3%)	1 (5.9%)
Well	5 (15.6%)	2 (13.3%)	3 (17.7%)
Not well	12 (37.5%)	7 (46.7%)	5 (29.4%)

Not at all	12 (37.5%)	4 (26.7%)	8 (47.1%)
Parent's Highest Level of Education			
Less than 8th grade	7 (21.9%)	3 (20.0%)	4 (23.5%)
9th – 12th Grade (No Diploma)	10 (31.3%)	2 (13.3%)	8 (47.1%)
H.S. Diploma or greater	15 (46.9%)	10 (66.7%)	5 (29.4%)
[1]Parents' response to "How well do you speak English?"			

Table 2. Acceptability of Intervention Survey among study population

Acceptability of Intervention Measure (AIM) question	**AIM mean score (range)* n= 25 parents**
The program met my approval.	3.5 (0.5) (3-4)
The program was appealing to me.	3.5 (0.5) (3-4)
I liked the program.	3.5 (0.5) (3-4)
I welcome what I learned in the program.	3.5 (0.5) (3-4)
*0 = Completely disagree; 1 = Disagree, 2 = Neither agree nor disagree, 3 = Agree, 4 = Completely agree	

Table 3: Effects of Ready and Healthy for Kindergarten participation (Group 1) compared to wait-list control (Group 2) on the home literacy environment and parent verbal responsivity[1]

	Group 1 Effect size estimate (95% CI)	P-Value
$StimQ_2$ READ Scale[2]		
Total score	0.55 (-0.44 to 1.10)	0.23
Subdimensions		
Book reading quantity	1.01 (0.05 to 1.52)	0.04

Book reading concepts	-0.20 (-1.41 to 0.52)	0.66
Book reading content	0.02 (-1.09 to 0.68)	0.95
Book reading quality	0.99 (0.18 to 1.41)	0.02
$StimQ_2$ Parent Verbal Responsivity Scale[2]	0.14 (-0.92 to 0.76)	0.75

[1]Linear regression adjusting for baseline scores, child age, child language, and parent education. Effect size estimates calculated by dividing the treatment coefficient estimate from regression models by the residual standard deviation of each outcome.
[2]Subscale of the $StimQ_2$ Preschool a parent-report questionnaire that assesses the cognitive home environment for children ages 36 months to 72 months

Table 4: Effects of Ready and Healthy for Kindergarten participation (Group 1) compared to wait-list control (Group 2) on child skills[1]

	Group 1 Effect size estimate (95% CI)	P-Value
Letters identified	0.07 (-1.07 to 0.71)	0.88
Letters sounds identified	-0.03 (-1.18 to 0.64)	0.95
Vocabulary words identified	-1.68 (-5.84 to 0.21)	0.10
Book awareness	0.82 (-0.23 to 1.35)	0.11

[1]Linear regression adjusting for baseline scores, child age, child language, and parent education. Effect size estimates calculated by dividing the treatment coefficient estimate from regression models by the residual standard deviation of each outcome.

Figure 1: CONSORT Diagram

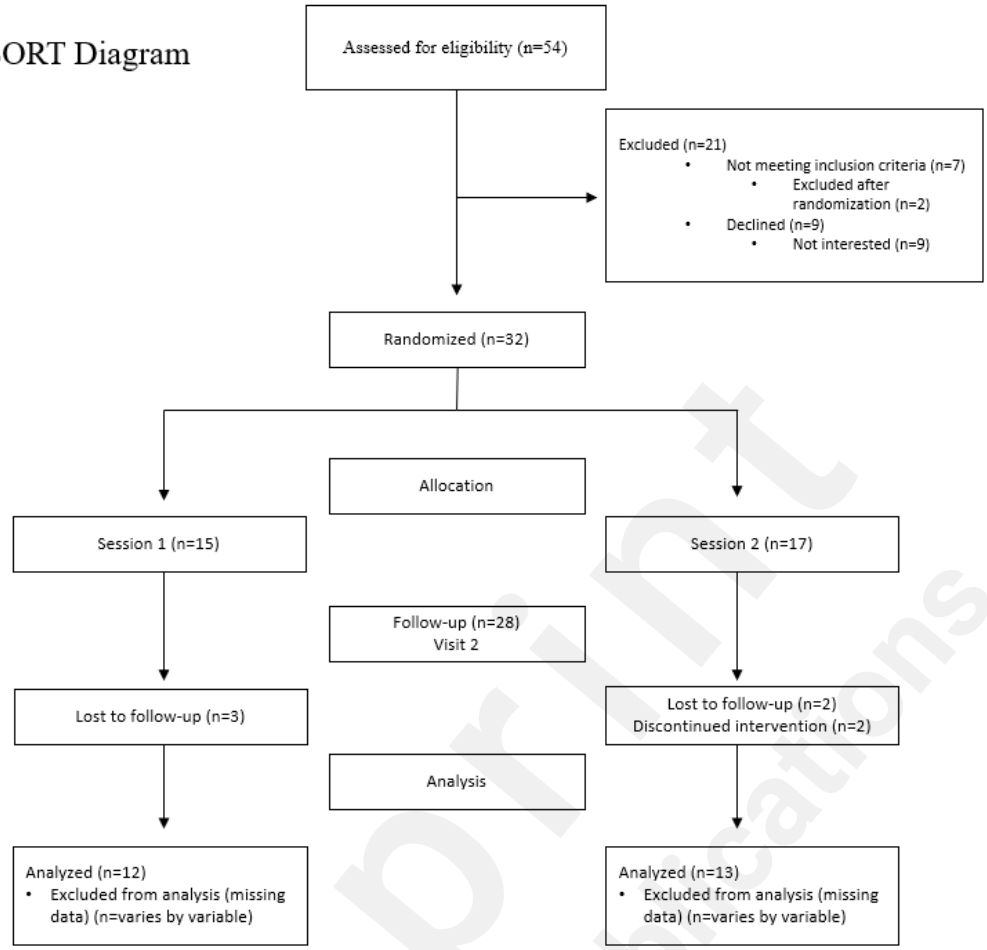

Figure 2: Number of workshops attended by participants during the family wellness program