Háblame Bebé: A phone application intervention to support Hispanic children's early language environments and bilingualism

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Abstract

The early language environments of low-income Hispanic children can be negatively affected when their Spanish-speaking caregivers face racism, assimilation pressure, and/or misinformed advice based on English-only ideologies. This article reports on the design and efficacy of Háblame Bebé, a language-promoting phone application that encourages low-income Hispanic mothers to talk more to their children in their native Spanish with the goals of (1) improving their children's early language environment, (2) promoting bilingualism, and (3) monitoring developmental milestones. The app was designed and tested across three phases as mandated by the US HRSA *Bridging the Word Gap Challenge*. In Phase I, we developed a curriculum that promotes high-quality language interactions in Spanish and designed the app components. In Phase II, we tested the app with 20 Hispanic mothers (half high school-educated, half college-educated) in a pretest–posttest design in which we examined their language interactions before and after two months of using the app. Preliminary results indicated that mother–child verbal interactions increased, but not always in their native Spanish, and the difference was not statistically significant. Focus group data revealed that many of the mothers had experienced linguistic racism and that tropes surrounding Spanish-speaking identity in the USA needed to be explicitly addressed within the intervention. In Phase III, a sociolinguistic pride component was added and the app was again tested with 12 additional

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Hispanic mothers (all high school-educated only). This time, a statistically significant increase in mother–child verbal interactions was found. Mothers also reported feeling prouder to use Spanish with their children. These results suggest that Háblame Bebé may be a viable means to reach low-income Hispanic caregivers who face obstacles in accessing health information and/or home-visiting programs for their children.

Keywords
bilingual, early childhood, educational phone app, Hispanic, language development

I Introduction

This article reports on the development and feasibility testing of a phone application intervention, Háblame Bebé. Háblame Bebé was developed as part of a federal competition conducted by the US Health Resources and Services Administration (HRSA), Maternal and Child Health Bureau to create low-cost, scalable, and technology-based solutions for improving children's language and literacy outcomes. The competition was set up as a three-phase accelerator that required prototype development in Phase I, testing and collection of user-based feedback in Phase II, and then modifications, additional testing and collection of user-based feedback in Phase III. Here we report on data from two empirical studies conducted in Phases II and III. We explain how mothers' focus group data and feedback after the first study informed the design changes of the app prototype for the second study. By conducting two separate studies, we learned that cultural socialization processes of Hispanics in the USA affects their children's language development, and that harmful language ideology can cause parents to abandon speaking their native Spanish with their children. We operationalize and propose a new cultural variable, sociolinguistic pride, to inform the way in which culture and socialization mechanisms affect children's language development. In doing so, the Háblame Bebé phone app intervention was able to promote behavioral change only after harnessing the strengths of cultural identity.

1 The importance of early language environments

One of the strongest predictors of successful language acquisition and academic success, independent of socioeconomic status (SES), is the quantity and quality of words spoken to a child in the first three years of life (e.g. Hoff, 2013; Hurtado et al., 2008; Rowe, 2012; Weisleder and Fernald, 2013). This language input during early childhood, which we refer to as 'Language Nutrition', is the rich, back-and-forth language exposure that is critical for linguistic and cognitive development (Head Zauche et al., 2016, 2017). From a public campaign perspective, 'language nutrition' is used as a metaphor and has been found to resonate well with nurses and parents (e.g. Head Zauche et al., 2017). Language Nutrition encompasses the quantity and quality of language that occurs during social interactions, such as talking, singing, or reading to a baby (Head Zauche et al., 2016) and significantly mediates a child's language and academic outcomes (e.g. Hurtado et al., 2008; Pan et al., 2005; Rowe, 2012; Weisleder and Fernald, 2013).

While all parents want the best for their children, the early language environments of children living in poverty versus children from more affluent families can vary significantly (e.g. Hart and Risley, 1995; Hoff, 2003; Huttenlocher et al., 2010). In a seminal study by Hart and Risley (1995), children living in lower-SES households were exposed to significantly more prohibitions and negative directives about their behavior (e.g. 'stop', 'don't'), and overall, by the age of three, heard 30

million words less than children from higher-SES households. These findings have been replicated and extended by several other researchers (Gilkerson et al., 2018; Hoff, 2003, 2006; Hoff-Ginsberg, 1991; Huttenlocher et al., 2010; Rowe, 2008; but see also Johnson et al., 2017). Fernald et al. (2013) demonstrated that SES disparities in language processing speed can be observed as early as 18 months. Hoff (2003) reported that parental communication with infants can mediate the predictive relation between SES and child vocabulary development. Similarly, other research has suggested that caregiver lexical diversity can change the relation between SES and child language outcomes (e.g. Huttenlocher et al., 2010). More recently, Romeo, Leonard, Robinson, et al. (2018) found that the number of conversational turns between children and their caregivers was associated with greater brain activation in neural systems involved in language processing for the children, and that this difference in their brain activation significantly predicted language skills. Overall, these studies suggest that parents can have a profound impact on their child's academic outcomes by engaging in quality, daily language interactions.

These language interactions may also impact literacy skills. Children's vocabulary at age three is a significant predictor of their ability to read at third grade, which is a key predictor of their academic trajectory in the long term: children who cannot read at grade level by the end of third grade are four times more likely to drop out of high school (Dickenson and Porche, 2011; Head Zauche et al., 2016; Rowe, 2012). A child's vocabulary is in fact more significant of a predictor of third grade reading proficiency than parent socioeconomic status and parent education (Dickinson and Porche, 2011; Head Zauche et al., 2016). Low rates of literacy have serious implications for the educational attainment, economic outcomes, and even health of children and of society at large (Fiester and Smith, 2010; Head Zauche et al., 2017; National Center for Health Statistics, 2012; Robert Wood Johnson Foundation, 2009; Sum et al., 2009). To address this, several public initiatives to increase parent–child interactions have been launched to deliver messages regarding (1) the importance of early language exposure and (2) how to support children's early language and literacy development (in the USA: Pequeños y Valiosos; Providence Talks; Talk With Me Baby; Reach Out and Read; Thirty Million Words Initiative; Too Small to Fail: Talk is Teaching; in the UK: Stoke Speaks Out; Talk To Your Baby Campaign). In conjunction with this goal, in 2016 the US Health Resources and Services Administration (HRSA), Maternal and Child Health Bureau conducted the nation's first federal challenge in which teams were funded to compete and create low-cost, scalable technology solutions to help parents and caregivers talk and engage more with their young children.

2 Why Hispanic children's bilingual language development should be supported

Hispanic children are the fastest growing population of children in the USA and represent over a fourth of US children who are about to begin school (Annie E. Case Foundation; US Census Bureau, 2016). They are at greater risk for poor educational outcomes because of the fact that they are more likely to live in poverty, have less access to quality health care, and are less likely to attend preschool before beginning kindergarten (Capps et al., 2005; Children's Defense Fund, 2011; Escarce and Kapur, 2006). Due to unfortunate tropes surrounding language and national identity in the USA, bilingualism is often not supported for these children (Carter, 2014; Zentella, 1997). Often, Hispanic, Spanish-speaking parents are made to believe they must switch to non-native English as a result of fear-based rhetoric, English-only policies, assimilation pressure, and/or misinformed advice, which affects their children's early language environments (Baralt et al., 2017; Fermoso, 2018). Encouraging parents to abandon their heritage, or home language with their children runs counter to science, as empirical evidence consistently shows that encouraging and maintaining the parent's heritage language during parent–child interactions leads to

better early language environments and resultantly, better child language and academic outcomes (August and Hakuta, 1997; Castro et al., 2011; Farver et al., 2006). Parents who use their heritage language with their children are able to convey more lexically and syntactically complex language during interactions with their children (e.g. August and Hakuta, 1997; Castro et al., 2011). Studies have found that native Spanish-speaking mothers who also are fluent in English use a larger and more diverse vocabulary when talking with their children in their native Spanish (e.g. Hoff et al., 2014). Gutiérrez-Clellen et al. (2012) reported that Hispanic children who had greater morphosyntactic productivity in Spanish acquired English faster than their peers who demonstrated less native Spanish morphosyntactic productivity. It can thus be argued that instruction and/or early childhood interventions in parents' heritage language do not negatively affect children's acquisition of English in school, and in fact, are beneficial to these children's language outcomes (e.g. Barnett et al., 2007; Durán et al., 2010). What's more, when parents speak to their child in their heritage language, the chance that their child becomes bilingual increases. Bilingualism confers significant cognitive, academic, and social-emotional benefits for children (e.g. Adi-Japha et al., 2010; Bialystok, 2009; de Abreu et al., 2012; Head et al., 2015), and has important sociocultural and identity implications. Promoting the family's home language encourages a maintained connection to their heritage and to their family's cultural values (Wong Fillmore, 1991). Children who are able to speak their parents' native language have better familial relationships and report that they feel closer to and interact more with their family (e.g. Oh and Fuligni, 2010). This has important and positive implication for families and for society (Wong Fillmore, 1991).

3 Goals of the present study

The changing demographics in the USA render a need to support low-income Hispanic parents in providing Language Nutrition in both English and Spanish, to feel supported in promoting bilingualism in their children, and to feel empowered to monitor their children's developmental milestones to better detect language delays; doing so may translate to literacy, academic, and health benefits for their children (Head Zauche et al. 2016). In response to Hispanic parents consistently reporting to us that they had been advised to switch to non-native English with their children (Baralt and Darcy Mahoney, 2019), we aimed to create an intervention that specifically serves Hispanic families as part of our participation in the federal competition (Baralt et al., 2017). In the next sections we describe each of the phases of the US HRSA Federal Challenge (Buerlein and Resnick, 2017) and the two empirical studies that led to the current app design.

II Phase I: Háblame Bebé phone app design

In the first phase we received funding from the US Health Resources and Services Administration, Maternal and Child Health Bureau to establish partnerships and to design the first Háblame Bebé app prototype. Our team consisted of three members: a Spanish language applied linguist, a neonatal nurse practitioner, and a developmental psychologist. We partnered with the *Bridging the Word Gap Research Network Group*, the state of Georgia's Department of Health *Talk To Me Baby* initiative, the state of Florida Department of Health, and WIC (Women, Infant, and Children) clinics of Miami-Dade County. We created content based on evidence-based recommendations from the literature and designed Language Nutrition education modules (e.g. Hoff and Naigles, 2002; Roberts and Kaiser, 2011; Romeo et al, 2018; Rowe et al., 2017).

III Phase II: Testing iteration 1

For Phase II, we tested the app with 20 mothers and their children. In the next sections we describe this first study, its outcome, and then the second study in which we tested an improved version of the app with more families, as well as its outcome.

IV Study 1

The research questions guiding the first study were:

1. Will mothers engaged with the app?
2. Will mothers' Language Nutrition to their children improve after using the app?
3. Does the app adequately serve families?

1 Method

a Participants. Participants in Study 1 were 20 mother–child dyads; one mother had two participating children (21 total children). Mothers were recruited from a large pediatric primary care center in Miami, Florida that primarily serves Hispanic, low-income children (60%). All mothers provided informed consent before being screened for the study. In line with the requirements of the US HRSA Federal Challenge, the inclusionary criteria were minimal: Spanish-speaking and at least one child between the ages of zero to four. Mothers' average age was 30 (SD 30.3); children's average age was 15 months (SD 6.8; 9 males). Half of mothers were living below the US federal poverty line. Nine mothers had only a high school degree, with one additional mother not finishing high school. The other 10 mothers had a college degree. Mothers' family income, country of origin, subjective social status, and material deprivation scores are provided in Table 1.

b Materials

Socioeconomic status questionnaire. The SES questionnaire inquires about participants' household income, education level, employment, number of people living in their household, and services and support, if any, that they receive (e.g. food stamps, Medicaid, WIC).

MacArthur Subjective Social Status Scale. The MacArthur SSS Scale is a single-item measure that assesses a person's subjective social status and has been associated with health and wellbeing (Adler et al., 2000). Participants are asked to place an 'X' on the ladder rung that bests represents where they stand relative to others in terms of finances, education, and employment. The measure is scored based on where the participant places their 'X' (lowest rung = 1, highest = 10). This assessment takes 3 minutes to complete.

Material Deprivation Questionnaire. The Material Deprivation Questionnaire asks participants to indicate if they experienced deprivation such as receiving free meals, not being able to pay the rent or mortgage, or going hungry because of financial problems. The instrument presents 14 items and participants indicate 'yes' or 'no' for each. The measure is scored based on the total number of deprivation items experienced, with a maximum score of 14. The assessment takes approximately 10 minutes to complete. (Note: the MacArthur SSS and the Material Deprivation measures were not used as predictors or covariates, but rather as a means to help us characterize our sample.)

Table 1. Demographic information on participants: Study 1.

Participant	Country of origin	Age	Education	Monthly income and other support	Children participating	MacArthur subjective social status scale	Material deprivation score
1	Cuba	31	High school	$1,000, WIC, Medicaid	2: male (10 months) and female (30 months)	4	5
2	Cuba	25	High school	$1,200, WIC, reduced price childcare, Medicaid	1: female (14 months)	4	3
3	Colombia	20	High school	$1,500, WIC, Medicaid, food stamps	1: female (8 months)	3	4
4	Guatemala	30	High school	$1,900, Medicaid, food stamps	1: female (17 months)	6	4
5	Perú	28	High school	$1,900	1: female (15 months)	8	2
6	Colombia	32	High school	$1,500, WIC, Medicaid, food stamps	1: female (24 months)	7	1
7	Cuba	29	High school	$1,900, WIC	1: female (8 months)	5	1
8	Colombia	32	High school	$1,200, reduced child care, WIC	1: male (11 months)	3	4
9	Venezuela	28	High school	$1,500, Medicaid	1: male (25 months)	5	1
10	Honduras	22	Some high school	$1,500, reduced child care, WIC	1: male (15 months)	5	3
11	Argentina	34	Bachelor's	$3,000, WIC	1: female (19 months)	6	2
12	Colombia	30	Bachelor's	$2,400, WIC, Medicaid	1: female (22 months)	6	2
13	Venezuela	29	Bachelor's	$2,500, WIC, Medicaid	1: male (8 months)	3	1
14	Colombia	43	Associate's Degree	$1,500, Food stamps, WIC, Medicaid	1: female (13 months)	3	4
15	Dominican Republic	30	Bachelor's	$3,500	1: male (11 months)	7	0
16	Cuba	28	Master's	$3,200	1: male (28 months)	7	0
17	Perú	31	Bachelor's	$5,500	1: male (10 months)	9	0
18	Venezuela	44	Bachelor's	$4,000	1: male (10 months)	7	1
19	Cuba	30	Bachelor's	$5,500	1: female (11 months)	5	1
20	Cuba	30	Bachelor's	$6,000	1: female (10 months)	8	0

Note. WIC = Women, Infant, Children clinic eligible.

Knowledge test. The researchers created a short, three-item test that assesses mothers' knowledge of key concepts specific to the study. The test was administered orally and asks: (1) What is Language Nutrition?; (2) Can you give examples of how you give Language Nutrition in everyday routines with your child?; and (3) What are some of the benefits of bilingualism?

Interaction video. Mother–child dyads participated in a 15-minute play- and reading-interaction from which we assessed mothers' Language Nutrition to their children. For the first 10 minutes, mothers were provided with a toy farm and instructed to play with their child and interact as they normally do. For the last 5 minutes, mothers were provided with a wordless picture book and were instructed to read the book with their child. The 15-minute play- and reading-interaction was videotaped and was then coded for four Language Nutrition variables: (1) total number of words, (2) total number of questions, (3) total number of directives, and (4) English-language switches. Directives included scolding or prohibitions such as *no hagas eso* ('don't do that') or *malo* ('bad'). Studies have reported that Hispanic mothers use more directives than Anglo, English-speaking mothers and that these directives have the potential to be detrimental to parent–child interactions (Hart and Risley, 1995; Ramos et al., 2018). English-language switches were the total number of times mothers switched into English. As our goal was to foster more Spanish-language input, we accounted for all of the times that mothers switched to non-native English to talk with their child.

Interview items. At the post-intervention visit, the researcher interviewed mothers and asked them about their perceptions of the app. Mothers were asked what they thought of the app, what components they liked the most and the least, what they used the most, and their ideas on how it could be improved to best serve their needs. They were also asked (open-ended) for any other ideas or suggestions regarding the teaching of Language Nutrition and the app to deliver this health information.

Focus group items. Three weeks after the post-intervention home visit, the researcher conducted focus groups with participants' families. These meetings incorporated a wide range of family members including grandparents, fathers, older siblings/stepchildren, aunts, uncles, and one great-grandparent. The question items asked during the focus groups were open-ended in nature and inquired about language(s) used in the home, language use with the child participant, language and academic goals for that child, and thoughts about language use in US society. The dynamic of the focus groups permitted family members to interact and to share and speak to each other's opinions. Family members were also asked about the app, whether anyone else used it besides the mother participant, and if anyone had any suggestions for how the researchers could improve the app to best serve their needs and their child's development.

c Intervention: App prototype 1. The first version of the Háblame Bebé phone app provided mothers with educational modules, push notifications, and lessons about Language Nutrition and the benefits of bilingualism. Language Nutrition was taught via videos with model caregivers proving Language Nutrition at different stages of development, as well as via the *Iniciadores de conversación* ('Conversation starters'). One-hundred and 20 Conversation Starters each were provided for 20 lifestyle themes, such as *Las salidas* ('Outings') or *En el autobus, tren o metro* ('On the bus, train, or metro'). Gamification techniques were used to incentivize mothers to use the app (King et al., 2013). For example, when the mother self-reported that she incorporated Language Nutrition into a daily routine, she clicked on the conversation starter topic and received a 'heart' emoji in the app as a reward/indication of success. Háblame Bebé also included a bilingual registry into which mothers could enter words in English or Spanish that their baby had spoken; this allowed mothers see how their
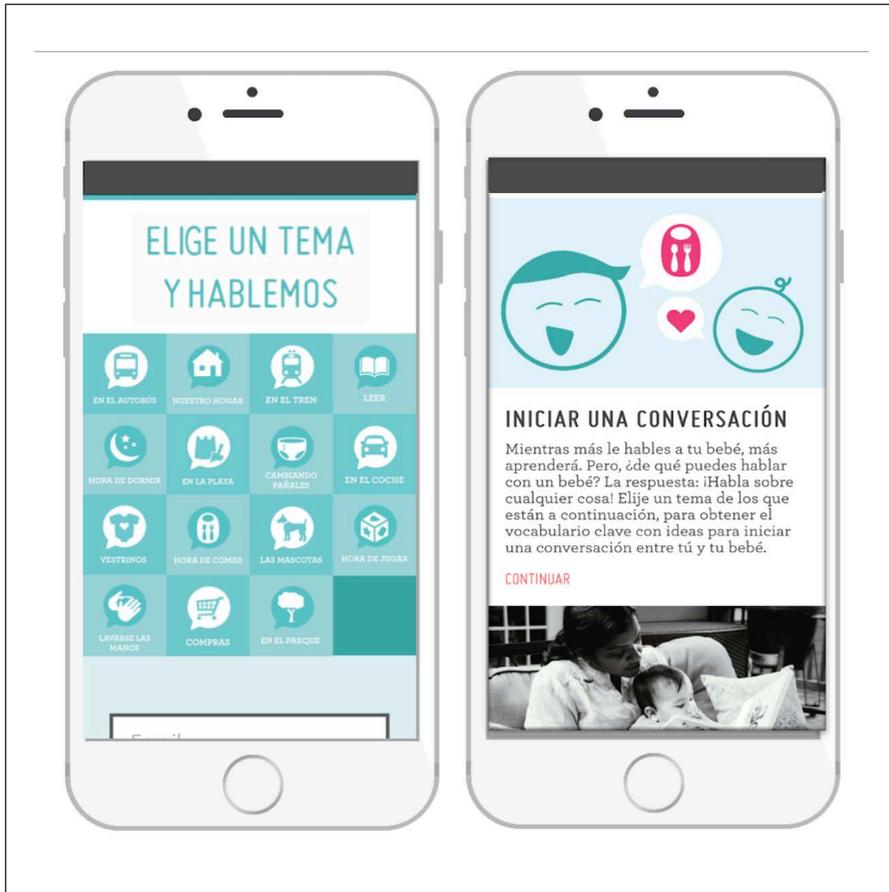
Figure 1. Háblame Bebé app interface: Study 1.

baby's bilingual vocabulary was growing. Another key component was the US Center for Disease Control and Prevention (CDC) 'Learn The Signs, Act Early' developmental milestones in Spanish, which users can check off once their baby has met that milestone. The final component of the app was the push notifications. Each week, mothers received text message reminders to provide helpful information or tips, and was additionally a method used to keep mothers engaged with the app. All content was provided in Spanish. Figure 1 shows the interface of the first app prototype.

d Procedure. Pre-intervention, all mothers completed (1) the socioeconomic status, MacArthur Scale of Subjective Social Status, and Material Deprivation questionnaires, (2) the knowledge test and (3) the interaction video. These were conducted in their home. Mothers were then introduced to the app prototype by being given a link from which they could download it. The researcher showed mothers how to create an account and provided instruction on how to use the app. For the intervention, mothers were asked to use the app for two months. During this time, they were encouraged to interact with the app as much as possible and to engage in its activities.

At the end of the two months, posttest measures were collected. During this visit, the researcher also conducted interviews with mothers to ask about their perceptions of the app. Interviews were

audio-recorded and the researcher took notes. Three weeks later, after the initial quantitative data was coded and preliminary analyses were run, the researcher returned to participants' homes to conduct focus groups with the entire family. The focus groups were also audio-recorded and the researcher again took notes.

Implementation fidelity was met via four ways. First, a detailed script and checklist for the initial training session and for each home visit was followed to ensure that all families received the same instructions and intervention procedure. Second, a weekly check-in, done by text message, was done to remind mothers to continue using the app. Third, the researchers confirmed mothers' use of with the app through Firebase, a backend platform that supports mobile app development and that reports on users' engagement, such as time on screen and whether a user reads push notifications. Finally, the same researcher (first author on this article) conducted all of the home visits, further strengthening intervention delivery fidelity.

e Analyses

Quantitative analyses. All videos were transcribed and coded for number of words, number of questions, number of directives, and number of switches into English. Ten percent of the videos was coded by a research assistant for reliability; reliability was 100% for all of the four variables. Analyses were conducted in SPSS version 24. To estimate the impact of the intervention on maternal language input, a Wilcoxon signed-rank test was used for each variable to examine change from pre- to post-intervention.

Qualitative analyses. The data from the focus groups consisted of the video-recordings, transcriptions, and the researcher's notes. Using a grounded theory approach, the transcripts and notes were qualitatively analyzed for free codes, hierarchical categories, and then theoretical coding. Free coding involved highlighting words and entire quotes by the participants to capture their experiences verbatim. These codes were then organized so that similar items, ideas, or phenomena were subcoded and connected. Next came the establishment of hierarchical categories, which involved moving from description to conceptualization and the labeling of 'higher-level concepts or themes, as well as the interconnection of coding decisions' (Baralt, 2012: 233). This included giving a name to a higher code that appropriately grouped together several free codes, and then applying the coding scheme to each family's focus group. The final iteration of coding was the reduction and interpretation of the data in order to generate an emerging theory. It involved comparing and contrasting themes, reflecting on patterns, and then discovering patterns in the data until saturation is achieved, or when no new themes are able to come out of the analysis.

2 Results

a Mothers' engagement with the app. The key engagement component of the app was the self-report of number of conversation activities with their child. All mothers (n = 100%) met the goal of receiving five hearts (range = 0–5) per day at least four times a week. Mothers with children who were producing words also entered words into the bilingual vocabulary database regularly, registering a total of 1,564 words across participants. Of these, 1063 words were in Spanish and 501 were in English. The app development platform Firebase confirmed this engagement by showing that mothers spent an average of 5 minutes on the app a day (mean = 5; SD = 2), four days out of the week.

b Mother's language input

Total number of words. For the free play activity, mothers' average number of words to their children increased from pre-intervention (531.3) to post-intervention (566.75). However, a Wil-

coxon Signed-rank test indicated that this increase was not statistically significant ($Z = -1.4$, $p = .162$). The mean number of words mothers produced during the book-reading activity also increased (310.25 to 327.6), however, this increase was also found to not be significant ($Z = -1.77$, $p = .078$).

Total number of questions. For the free play activity, mothers' average number of questions increased only slightly from an average of 33.85 questions pre-intervention to 36 post-intervention. A Wilcoxon Signed-rank test revealed that this increase was not significant ($Z = -1.21, p = .226$). The same pattern was observed for the book reading activity. Mothers' questions increased from 14.2 to 17.9; this increase however was not significant ($Z = -1.58, p = .112$).

Negative directives. During the free play activity, mothers' use of negative directives to their child increased from an average of 8.7 to 11.4. This was not significant ($Z = -1.26, p = .207$). During the book reading activity, negative directives also increased slightly from an average of 6.55 pre-intervention to 7.6 post-intervention; this was also found to be insignificant ($Z = -.756$, $p = .450$).

English-language switches. Mothers' use of non-native English during the free play activity increased pre-intervention from an average of 27.15 to 31.7. This increase was found to be statistically significant ($Z = -2.201, p = .028$). Mothers also increased the number of times they switched into English during the book reading activity: average English-language switches increased from 20.8 to 29.85. This increase was also found to be significant ($Z = -2.936, p = .003$).

Knowledge of key concepts. Before the intervention, not one mother could define Language Nutrition. After the intervention, all 20 mothers were able to do so; they were also able to cite some of the benefits of bilingualism. At the same time, all mothers in Study 1 reiterated the importance of speaking English in the US. Examples of mothers' answers, translated, are as follows:

- Language Nutrition:
  - Your baby needs language nutrition just like he needs food nutrition. (Participant 2)
  - Talking to my baby will help her do well in school. (Participant 10)
  - Talk to your baby with as many loving words as you can – it helps his brain! (Participant 14)
- Benefits of bilingualism:
  - It is good for your brain to speak more than one language. However, in this country English is the most important language. (Participant 16)
  - It's good for their attention to know two languages. (Participant 7)

In summary, mothers' total number of words, questions to their children, and use of negative directives during both the free play and book-reading activity increased but not significantly. Mothers' use of non-native English, and switches into English during the activities, did increase significantly.

Qualitative data: Does the app adequately serve families? The focus groups provided insight into a possible reason for why mothers' Language Nutrition did not significantly improve in Study 1. Overall, mothers understood the Háblame Bebé app very well, and liked being able to track their children's vocabulary and developmental milestones. Nine mothers mentioned that they had never seen the 'Learn The Signs, Act Early' developmental milestones before, and felt more informed,

especially given that they were provided for them in Spanish. Other family members who participated in the focus groups also shared this sentiment; many also expressed that they learned from the app about their own role setting up their child for academic success. However, while all participants agreed on the importance of Language Nutrition, they did not agree that Spanish language use would contribute to their child's development. This belief came directly from larger tropes in US society and the inherited belief that in order to assimilate, they needed to learn English and abandon Spanish. Every mother in the study, and at least one other family member of those mothers with a high school education or less, reported that they had experienced linguistic racism in the USA. They shared stories of being ostracized and publicly chastised for using Spanish; several also reported that their child's pediatrician had recommended they switch to English. Many family members indicated that older siblings were becoming more dominant in English and they did not know how to handle when their child responded to them in English. Thus, we concluded that no, the app prototype 1 did not sufficiently serve families and their needs.

In the second half of the focus group, families were told that Spanish-language use is important because it is only in using the language that a child will become bilingual. They were also told that speaking in their native language with their children would in fact support their child's development and school readiness better, because their native language will always be a richer source of input. All mothers reported that they would like more information on how to balance this science with the problem of language ideology in the USA. Families were then asked to brainstorm on how this message might best be delivered to other families in the app. One mother suggested a hashtag of #enraicémonos, or 'let's get in touch with, let's be proud of, our roots.' The focus groups then generated several additional suggestions for how to promote bilingualism and to empower other Hispanic parents to feel both proud and safe to talk to their children in Spanish. The main qualitative themes from these focus groups, as well as the family-generated solutions, are summarized in Table 2.

V Phase III: Testing iteration 2

This user-based data obtained from Study 1 informed how we would modify the app intervention to meet the needs of our demographic. In Phase III, we significantly changed the core message of the app to promote and emphasize sociolinguistic pride (explained below) and tested the new and improved design with an additional cohort of low-income mothers.[1]

VI Study 2

The research questions guiding the second study were:

1. Will mothers engage with the app?
2. Will mothers' Language Nutrition to their children improve after using the app?
3. Will mothers' sociolinguistic pride increase after using the app?
4. Is the app culturally valid?

1 Method

a Participants. Participants in Study 2 were 12 mother–child dyads; three mothers had two participating children each (15 total children). Mothers were recruited Women, Infant, and Children (WIC) Clinics in Miami-Dade County. All mothers provided informed consent before being screened for the study. The inclusionary criteria were Spanish-speaking, at least one child between the ages of zero to four, and lower socioeconomic status. All mothers had a high school education

Table 2. Hispanic families' experiences and suggestions for encouraging more Spanish-language Language Nutrition: Key themes from focus groups.

Theme	Definition	Quote or example
Experiences: Reasons for abandoning Spanish		
Linguistic racism	The experience, often publicly, of being told that 'this is America,' that English is better than Spanish, and that Spanish is not permitted. Being threatened or chastised for speaking Spanish.	'I have been out in public with my children and speaking to them in Spanish, and *gringos* [sic] have said that "this is America, speak American" [sic].'
		'I have had people call me out for speaking Spanish.'
		'I was once at a CVS with my son, and doing everything that the app taught me, I was describing to him everything that we were looking at, and when I got in the line, two men said loudly, so that I would hear, "this is AMERICA" and said that I needed to speak English. It was humiliating; they were targeting me and the way I was talking to my baby. I felt scared.'
Linguistic assimilation	The belief that in order to assimilate to US culture, to adapt and to be successful, adult immigrants and their children need to switch to English. This implies abandoning their heritage language, Spanish.	'In order for my child to do well in school he needs to know English.'
		'I want to speak English too with my child; we watch TV in English, we try and do everything in English. I want to help her succeed.'
		'In order to go far in this country you have to speak English. The fact is, English will help our children.'
Lack of support or information	Not knowing how to support their child's bilingualism.	'I'm not really sure how to promote *both* English and Spanish. Don't you all believe that we should promote English?'
		'His older siblings all speak in English to each other. They also respond to me and my husband in English. I don't really know how to handle this, I think it's too late.'
		'If I talk to my baby in my native Spanish, how can I support her English language development too? She will need this for the school.'
Suggestions: how to encourage and empower other Hispanic families to use their native Spanish with their children		
Sociolinguistic pride	The pride to be Hispanic, to speak Spanish, and to promote a proud bilingual and bicultural identity.	'The hashtag, #enraicémonos. Because, we need to spread the message of being proud of and of getting in touch with our roots. And language is the basis of this!'
		'Unfortunately in this country, our children will lose their English. It is up to us Hispanic parents to teach them Spanish. It IS possible. Let's be proud of our roots.'
		'I want my children to speak the language of their mother, of their grandparents: Spanish.'

Table2 (Continued)

Theme	Definition	Quote or example
Educational tools	Tools that specifically address Spanish language maintenance in the USA alongside the development of English. This should also apply for older siblings and for children with developmental delays and/or autism.	'I would love to have more tools.'
		'My older daughter has autism. I really thought that she needed English only; it's what the pediatrician said. I would like to know how to teach her Spanish now. How do I do that with the English too?'
		'How do I balance English and Spanish, especially if I am more comfortable in Spanish? What resources are there?'
Empowerment to respond to ignorance and/or misinformation	The knowledge base that allows one to respond appropriately if someone tells them to speak English only (whether due to racism or to misinformed advice)	'I would like to know how to respond to the ignorant people who make Hispanics feel bad for speaking Spanish.'
		'If my pediatrician says I should switch to English, but you are saying it's ok to keep speaking Spanish, how to I respond to him?'
		'I would like more . . . information on the benefits of using Spanish in the USA so that I know how to justify it with my children.'

equivalent or less during the data collection period, and they were living at or below the US federal poverty level. Mothers' average age was 30 (SD 30.3); children's average age was 15 months (SD 6.8; 9 males). Mothers' family income, country of origin, subjective social status, and material deprivation scores are provided in Table 3.

b Materials. The same materials from Study 1 were included in Study 2, with the addition of a new researcher-created instrument: a sociolinguistic pride questionnaire. Additionally, during the post-intervention focus groups, we added three questions asking families (1) whether they would continue using the app; (2) their overall acceptance of the app; and (3) whether they would recommend the app to others or not. For the purpose of space, we only describe the new sociolinguistic pride questionnaire instrument below.

c Sociolinguistic pride questionnaire. Based on our findings from Study 1, we created an instrument to measure our new variable, sociolinguistic pride, which was found to have a key role in mothers' use of their native Spanish (or not) with their children. Originally, a 15-item questionnaire was created in which mothers had to indicate how much they disagreed or agreed with statements such as *Hablar en español es parte de mi identidad* ('Speaking Spanish is part of my identity') and *No me siento segura hablando en español en este país* ('I do not feel safe speaking in Spanish in this country'). Agreement was determined on a four-point Likert scale. As is recommended in questionnaire design research, both regular and reverse order statements were included in the instrument (Dörnyei, 2003). To test the internal consistency of the questionnaire, Pearson's correlation was calculated for all 15 items. Three items ended up being removed; Pearson's correlation was calculated again pre-intervention (α = 73.) and post-intervention (α = .77); these results indicated that that the questionnaire did measure the construct of sociolinguistic pride (see Appendix 1). The maximum score, indicated highest level of sociolinguistic pride, was 12; the lowest score was zero. This instrument takes 5–10 minutes to administer.

d Intervention: App prototype 2. The second version of the Háblame Bebé phone app was designed so that the main focus of the intervention was promoting sociolinguistic pride. In other words, we aimed to teach about the importance of Language Nutrition in parents' native Spanish, but with sociolinguistic pride as the reason for doing so. New modules were created that taught explicitly about sociolinguistic pride and that promoted the message of #enraicémonos ('let's get in touch with, let's be proud of, our roots'), the mother-suggested hashtag from Study 1. New videos were also created that showcased other Hispanic parents talking about the importance of being proud to be Hispanic, to promote Hispanic culture with your children, and to speak Spanish. For example, in one video, two parents say the following message in Spanish (translated):

> We are a Hispanic family and we want to invite you to engage in Language Nutrition with your children, to know how important our language [Spanish] is . . . For us it is very important that our children are never ashamed to speak their language, that they are proud and they grow up being proud of us and our language – they will have more opportunities . . . Keep speaking Spanish to your children!

Videos were also created that explicitly addressed language ideology in the USA and how to respond if it is suggested that Spanish is not permitted or should not be spoken. For example, in one video, we interviewed a community member who articulates the following (translated):

> If you ever encounter an ignorant person who tells you that this is America and you should speak English only, ha! What an ignorant person! Remember – your bilingualism gives you brain *and* economic power. It is beautiful to be Hispanic and Spanish-speaking. Let's be *proud* of our roots.

Table 3. Demographic information on participants: Study 2.

Participant	Country of origin	Age	Education	Monthly income and other support	Children participating	MacArthur subjective social status scale	Material deprivation score
1	Cuba	35	High school	$730, WIC, Medicaid, SSI, food stamps	2: male (16 months) and female (39 months)	4	6
2	Honduras	24	Some high school	$1,500, WIC, reduced price childcare, Medicaid	1: male (16 months)	5	3
3	Venezuela	31	Some high school	$1,850, WIC, Medicaid	1: male (8 months)	6	1
4	Colombia	28	High school	$1,900, WIC, Medicaid	1: F (30 months)	4	3
5	Venezuela	33	High school	$1,950, WIC, food stamps	2: female (10 months) and male (30 months)	6	1
6	Dom. Rep.	32	Some high school	$1,800, WIC	1: female (12 months)	4	1
7	Venezuela	37	High school	$1,700, WIC, Medicaid	1: female (35 months)	6	1
8	Venezuela	29	High school	$1,200, WIC	1: female (24 months)	3	4
9	Venezuela	37	High school	$1,500, WIC	2: male (4 months) and male (46 months)	4	5
10	Cuba	23	Some high school	$1,900, WIC, food stamps	1: male (10 months)	5	0
11	Venezuela	30	High school	$1,500, WIC	1: female (17 months)	4	5
12	Cuba	33	Some high school	$1,900, WIC	1: female (15 months)	6	1

Notes. WIC = Women, Infant, Children clinic eligible; SSI = Supplemental Security Income.

Videos that discussed how to promote bilingual language development in users' children were also included. For this, we made videos that showcase experts as well as parents who speak about promoting bilingualism in parents. As an example, a scholar explains:

> To promote bilingualism, it's super important that you talk to [your children], tell them stories, read to them, that you tell them jokes, and that you keep talking as much as possible *in Spanish*.

Another way that sociolinguistic pride was promoted was via the push notifications. In addition to reminders to 'keep talking with your baby', some of the text messages specifically mentioned the pride to be Hispanic and to speak Spanish as necessary for children to be proud bilinguals and to do well in school. As an example, one of the text message reminders sent to mothers stated the following (translated):

> Keep speaking Spanish to your baby. You can do it! The best way to promote bilingualism is by showing your baby that you're proud to be Hispanic and Spanish-speaking. Let's teach our children how beautiful our culture is! #enraicémonos

We additionally sought to include representation for multiple Spanish linguistic varieties in these videos. One Nicaraguan mother proudly employs her voseo[2] dialect in a video; for example (translated):

> Being bilingual for me is like having a superpower. Bilingualism is the best gift that we can give to our children. I speak English and Spanish. Ah – and like a good nica [Nicaraguan] – ¿vos me entendés? [you know what I mean?]. For me it's important to talk like this, because I'm really proud of my Nicaraguan roots. Enraizáte vos también!

Like the first prototype, the second version of the app included the educational modules about Language Nutrition; *Iniciadores de conversación* ('Conversation starters'; bilingual word registry; 'Learn The Signs, Act Early' developmental milestones, and push notifications. The main difference between the two app versions was the inclusion of sociolinguistic pride that undergirded the message to engage in more quality language interactions with their children. Figure 2 shows some of the sociolinguistic pride components of the second app prototype. A final difference between this version of the app was the ability to share results on social media (Facebook and Instagram). For this, mothers could choose to post photos or videos of their child engaging in language interaction with them, with the hashtag #enraicémonos to express sociolinguistic pride.

e Procedure. As with Study 1, pre-intervention, all mothers completed (1) the socioeconomic status, MacArthur Scale of Subjective Social Status, and Material Deprivation questionnaires, (2) the knowledge test and (3) the interaction video in their home. They also completed the sociolinguistic pride questionnaire. Mothers were then introduced to the app prototype by being given a link from which they could download it. The researcher showed mothers how to create an account and instructed them on how to use the app. For the intervention, mothers were asked to use the app for two months. Mothers were given the same instructions as in Study 1: to interact with the app as much as possible and to engage in its activities.

After the two months were completed, the researcher returned to mothers' homes to collect the post-intervention interaction video data and to administer the sociolinguistic pride questionnaire. During this final visit, the researcher conducted interviews with mothers to ask about their
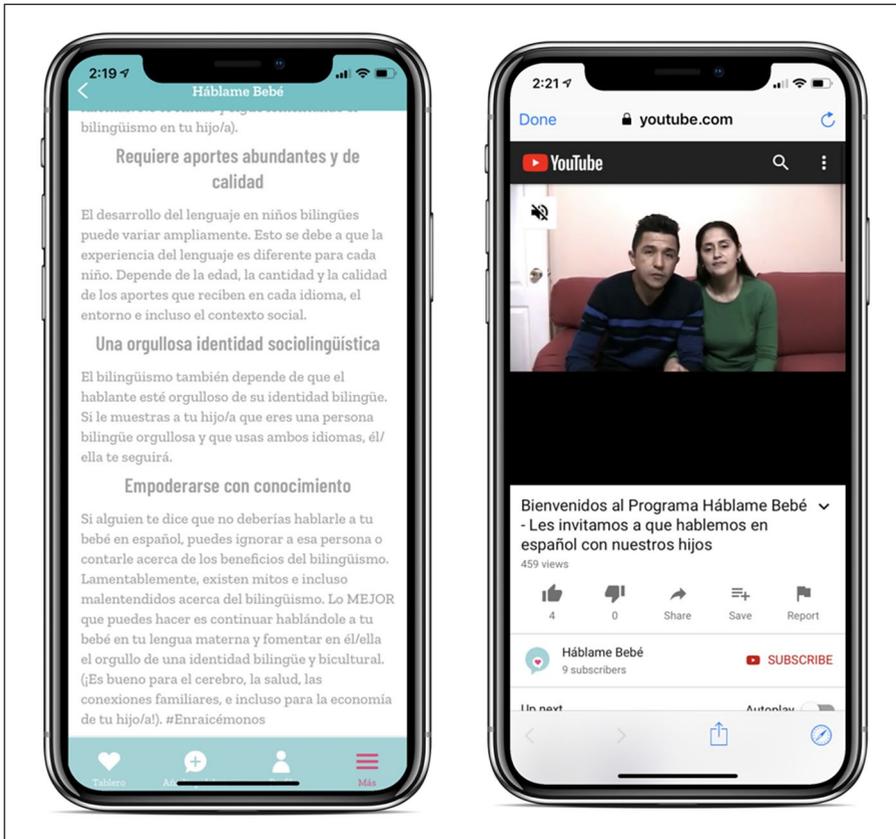
Figure 2. Háblame Bebé app interface: Study 2.

perceptions of the app and suggestions for its improvement. Interviews were audio-recorded and the researcher took notes. One week later, the researcher conducted the final visit, during which focus groups with mothers and their families were conducted. As with Study 1, focus group participants included fathers, grandparents, aunts, uncles, older children, and cousins.

Implementation fidelity was met by following a detailed script and checklist for each home visit; a weekly, text-message check-in to remind mothers to continue using the app; Firebase data (the backend app platform that reports on users' app engagement); and via the same researcher performing all home visits for consistency's sake.

f Analyses

Quantitative analyses. Analyses in Study 2 were identical to Study 1. Ten percent of the videos were coded by a research assistant for reliability; reliability was 100% for all of the four variables.

Qualitative analyses. Qualitative data for Study 2 came from the recordings and the researcher's notes during the focus groups, which were qualitatively analyzed by employing the same grounded theory approach as in Study 1. The qualitative analysis for study 2 sought to gain insight on their perceptions of its cultural validity.

2 Results

a Mothers' engagement with the app. All mothers self-reported that they met the daily goal of all five hearts at least four times a week. Additionally, all mothers earned hearts for the conversation starters in all 20 of the possible lifestyle themes, indicating that they were reviewing the variety of Language Nutrition examples in the app (e.g. bath time, cooking, diaper changing, in my arms). All mothers also used the bilingual vocabulary database, registering a total of 684 words across all participants. Of these, 465 words were in Spanish and 219 were in English. Mother's interaction with the Háblame Bebé social media was additionally indicative of intervention engagement. All mothers reported following the Háblame Bebé Instagram account and eight mothers reported following the Facebook site, liking content, sharing it, tagging friends, and sharing screenshots of their baby's registered words. All mothers also reported telling their friends about the app. Importantly, all of the Phase III participants, a highly vulnerable group, stayed in the study the entire time, suggesting high engagement by the families. The app development platform Firebase also confirmed high engagement with the app. Mothers spent an average of 5 minutes on the app a day, four days out of the week. Every module on bilingualism and on sociolinguistic pride was studied by each mother. Every mother also watched every single video.

b Mother's language nutrition

Total number of words. For the free play activity, mothers' average number of words to their children increased from pre-intervention (485.75) to post-intervention (682.83). A Wilcoxon Signed-rank test indicated that this increase was statistically significant ($Z = -3.06$, $p = .002$), and with a large effect size (Cohen's $d = .63$). For the book reading activity, mothers' average number of words also increased from pre-intervention (406.58) to post-intervention (504.75). This increase was also found to be significant ($Z = -2.98$, $p = .003$) also with a large effect size ($d = .61$).

Total number of questions. For the free play activity, mothers' number of questions to their children increased from an average of 38.3 pre-intervention to 49.92 post-intervention. A Wilcoxon Signed-rank test showed that this increase was statistically significant ($Z = -2.83$, $p = .005$), and with a medium effect size (Cohen's $d = .58$). Mothers' average use of questions also increased during the book reading activity, from 14.16 pre-intervention to 25.25 post-intervention. This increase was found to be statistically significant ($Z = -2.31$, $p = .021$), and with a medium effect size (Cohen's $d = .47$).

Negative directives. During the free play activity, mothers' use of negative directives to their child decreased from an average of 9.3 to 5.8. A Wilcoxon Signed-rank test revealed that this was not significant ($Z = -1.19$, $p = .234$). During the book reading activity, the average number of negative directives was also found to decrease from 4.08 pre-intervention to 1.19. post-intervention. This also found to not be significant ($Z = -.479$, $p = .632$).

English-language switches. Mothers' use of non-native English during the free play activity decreased pre-intervention from an average of 16.74 to 5.67. A Wilcoxon Signed-rank test found that this decrease was not significant ($Z = -4.24$, $p = .671$). Mothers also decreased in their use of non-native English word switches during the book reading activity, averaging 3.33 English-language switches pre-intervention, and only 1.5 English-language switches post-intervention. Due to such minimal use of English during the interaction video, the Wilcoxon Signed-rank test showed that this decrease was not significant ($Z = -1.06$, $p = .288$).

Knowledge of key concepts. Before the intervention, not one mother in Study 2 could define Language Nutrition or cite a benefit of bilingualism other than economic ones (e.g. 'it helps you find a job'). After the intervention, all mothers were able to do so. Participants cited this new knowledge, as well as a pride to be Hispanic, as driving their change in behavior. Below are some examples of their definitions, translated:

- Language Nutrition:
  – Talk to my baby with many loving words and patience! (Participant 21)
  – Talk to your children as much as you can . . . This helps language to develop, it will be bigger. (Participant 25)
  – Say as many loving words as is possible, as a form of nutrition, and do so in Spanish! (Participant 30)
- Benefits of bilingualism:
  – It helps their brain a lot. They can pay attention better. (Participant 26)
  – It's better for the brain to have two vocabularies than one! (Participant 32)
  – It has so many benefits, the speaking of Spanish too, especially to be proud of who they are. (Participant 22)

Sociolinguistic pride. The last change that took place as a result of using Háblame Bebé was mothers' increase in feeling proud and safe in using their native Spanish, measured via our researcher-created sociolinguistic pride questionnaire. Half of the mothers demonstrated a significant increase in reported pride and safety in the usage of their heritage language. Pre-intervention, all of these mothers scored three or lower; post-intervention, all scored a 10 or higher. All six reported experiencing linguistic racism surrounding their use of Spanish, and that after using the app, they felt more empowered to handle these kinds of situations in the future. The other half of the mothers in Study 2 were recently-arrived immigrants to the United States who had not culturally assimilated yet (e.g. political asylum grantees from Venezuela). Most of these mothers reported feeling proud to be Hispanic from the beginning, with scores of 10 or higher pre-intervention. Thus, no major change was seen in these mothers a result of using the application, because they knew nothing else than their own culture and had not yet experienced linguistic racism.

c Qualitative data: Is the app culturally valid. To determine the cultural validity of the app, qualitative data from the focus groups conducted one week after the study concluded as well as mothers' app engagement data were synthesized. All mothers reported that the app taught them about Language Nutrition and that they felt confident in their own ability to give Language Nutrition to their baby during every-day routines and would continue to do so. Mothers also unanimously reported that the videos from the app helped them to see that they can and should feel good and proud to use Spanish with their children. They cited pride in speaking Spanish and in being Hispanic as the driver behind their behavioral change. A consensus on this was observed across the whole family: mothers, fathers, and grandparents reported that using their native Spanish is best to ensure maximum vocabulary acquisition for their baby in order encourage bilingualism, and that the app provides families with the tools to also seek out quality English interactions as well for their children, such as going to the public library. Mothers reported that they were motivated by being able to earn hearts in the app, and by being able to see their baby's vocabulary grow in the bilingual word registry. All mothers said that they liked the reminders, that the app was a positive experience and was fun. Other family members also participated in the intervention. Two grandmothers and two fathers shared that they studied the Conversation Starters as examples of how to give Language Nutrition, and at least one family member in every focus group reported watching the sociolinguistic pride

videos with the mothers. As with Study 1, many participants shared stories of having experienced linguistic racism; however—notably—this time, families communicated the knowledge and the confidence to handle these moments of *ignorancia* ('ignorance'). Mothers' engagement with the Háblame Bebé as confirmed by Firebase and by social media was also indicative of their acceptance of and engagement with the intervention. Taken together, these data indicated that the Háblame Bebé app was accepted by the low-income Hispanic families in the study, and that they viewed the app as culturally valid.

3 Discussion

Háblame Bebé is the first educational mobile phone app to (1) teach low-income Hispanic parents about Language Nutrition for their child's developing brain and to (2) advocate for speaking Spanish within the home by promoting sociolinguistic pride. As Hispanics have disproportionately lower socioeconomic status compared to the national average as well as reduced access to vital information regarding their child's early language development, our app may provide a means to deliver this crucial information and increase the chances of successful language acquisition, bilingualism, and later academic success for these children.

The quantitative and qualitative data reported on here demonstrate two key outcomes. First, the required two-phase aspect of our study, in which we sought out user-based feedback on why the app design in Phase I did not work, was essential to learning a key lesson: language ideology in US society can impact how Hispanic mothers interact to their children. It was only after learning this and changing the app's focus (sociolinguistic pride), that significant improvements in mothers' language input were observed. Second, and as demonstrated in Phase II, the Háblame Bebé app was capable of reaching a low-income and vulnerable population and of changing behavior. In Phase II, Hispanic mothers' quantity and quality of language input to their children significantly improved from pre- to post-intervention. They were also able to verbally express key concepts (e.g. Language Nutrition, bilingual child development, the benefits of bilingualism, etc.) presented in the app and cited this new knowledge as the catalyst for their behavior change. Additionally, many of our families reported experiencing linguistic racism and discrimination when using Spanish; after the Phase II intervention, mothers reported more feelings of empowerment and sociolinguistic pride.

The results of our two-phase study also highlight the need for interventions catered to culturally and linguistically diverse families. There are very few culturally-responsive interventions for low-income Hispanic families, and low-income Hispanic children are at a significantly greater risk for language delays when their caregivers have been directed to speak to their children in non-native English in order to assimilate (Carter, 2014; Montrul, 2013). It would be an omission to not acknowledge the popular figurations of 'Hispanic/Latinx' and 'Spanish-speaking' as social categories in US society as part of this misinformation problem (Carter, 2014). Scholarship in sociolinguistics and linguistic anthropology has revealed that many low-income Hispanic caregivers may not interact with their children in their native Spanish due to the perception that Spanish language use overlaps with social inequality for Hispanics in the USA (e.g. Carter, 2014; Carter and Callesano, 2018). Carter (2014) and Zentella (1997) have also described the 'double figurative' of Spanish in the USA, where Spanish language use is productive and positive for Anglo-whites but is unproductive and negative for Hispanics. The data reported on here demonstrate that this language ideology is harmful and can impact the early language environments of young Hispanic children. The Háblame Bebé phone app aims to empower families to combat this ideology by fostering Hispanic sociolinguistic pride.

4 Limitations

This study does not go without limitations. First, as this was a feasibility study, a control group was not employed. In addition, only four characteristics of mothers' language input to their children were examined. This was due to the fast-pace iterative 'feedback loops' as required by the US HRSA Federal Challenge. In the future, it will be necessary to explore more features of language input and with a randomized control trial. Third, our sample was primarily from the Caribbean. It will be necessary to work with a more diverse sample of Hispanic families to examine the efficacy of Háblame Bebé as an intervention as there is substantial heterogeneity of Hispanic/Latinx people in the USA. For example, the US Office of Minority Health classifies this ethnic group to include any person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race. Expanding our understanding of how this diverse group utilizes health information from technology and smartphones will be important for future research, scaling and outreach in order to improve health and academic disparities. A fourth limitation is that this study reported on short-term findings only. Longitudinal data will be imperative to see if the results are maintained and what the intervention length and dosage is that is needed for the app and for follow-up. Further, as with any observational study, there is the possibility of a Hawthorn effect. While many studies obtain language samples through recordings, this has the potential to influence the ecological validity of the measure used, and so future studies could triangulate different measures of parent–child language interaction. Finally, while mothers are often the primary caregivers in a home, they are not the only caregivers. Fathers expressed interest in Háblame Bebé and had much to contribute during the focus groups. Future studies should include a broader sample of caregivers to represent the strength of Hispanic families, and in particular, fathers.

VII Conclusions

Háblame Bebé is an effective and free means to successfully deliver health information about children's early bilingual language development and literacy outcomes to low-income Hispanic caregivers. In order to break down barriers for health disparity groups, it is imperative that multiple, fast-paced cycles of feedback and testing be considered in order for interventions to be useful for families' needs. The knowledge gained from families during Phase II testing about linguistic discrimination and feelings of sociolinguistic shame was a pivotal point. It was crucial to combat negative stereotypes about Spanish use and bilingual language development in conjunction with presenting evidence-based knowledge on early brain and language development. The lessons learned and the results of the two studies presented here have implications for clinicians and early childhood educators when designing interventions to improve the early language experiences of low-income Hispanic children. In operationalizing a new variable that came out of our data, sociolinguistic pride, we have attempted to contribute to what we know about the cultural context of child language development. This work could be extended to other at-risk populations such as refugee families and immigrants in different contexts. Expanding this research and extending it to other populations while scaling the current application requires important trusted public-private partnerships to gain broad uptake with these vulnerable populations. We call for more research on how cultural socialization processes can impact parent–child interactions, and resultantly, how to best to support Hispanic children's language and literacy development.

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Notes

1. The Health Resources and Services Administration, Maternal and Child Health Bureau required us to collect data on the second prototype with additional mothers and children. This time, it was required that all mothers be low-income as this was the target demographic that the prototypes should aim to serve. In the short amount of time between Phase II and III, we were able to recruit 12 mothers from WIC clinics.
2. Voseo refers to a pronoun system in Spanish where speakers use the pronoun *vos* instead of *tú* for the second person singular 'you'. The verbal paradigm also changes. In some Spanish linguistic varieties, the voseo forms are stigmatized. Representation from these speakers was deliberate in our choice of videos to foster sociolinguistic pride.

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Appendix 1. Sociolinguistic pride questionnaire.

1. Me siento orgullosa de ser hispana/latina.

Totalmente en desacuerdo	En desacuerdo	De acuerdo	Totalmente de acuerdo
1	2	3	4

2. Hablar en español es una parte esencial de mi identidad hispana/latina.

Totalmente en desacuerdo	En desacuerdo	De acuerdo	Totalmente de acuerdo
1	2	3	4

3. Me siento segura usando el español con mi bebé en este país.

Totalmente en desacuerdo	En desacuerdo	De acuerdo	Totalmente de acuerdo
1	2	3	4

4. Usar el español le fortalece a uno, le hace sentir más poderoso/a.

Totalmente en desacuerdo	En desacuerdo	De acuerdo	Totalmente de acuerdo
1	2	3	4

5. Hablar inglés es una parte importante de mi identidad hispana/latina.

Totalmente en desacuerdo	En desacuerdo	De acuerdo	Totalmente de acuerdo
1	2	3	4

6. Me gusta cuando los vendedores me hablan primero en español.

Totalmente en desacuerdo	En desacuerdo	De acuerdo	Totalmente de acuerdo
1	2	3	4

7. Me siento orgullosa de que mi ciudad sea una ciudad bilingüe.

Totalmente en desacuerdo	En desacuerdo	De acuerdo	Totalmente de acuerdo
1	2	3	4

8. A mí me gusta cuando las tiendas ponen música en español.

Totalmente en desacuerdo	En desacuerdo	De acuerdo	Totalmente de acuerdo
1	2	3	4

9. Creo que el inglés debería ser el idioma oficial de los Estados Unidos.

Totalmente en desacuerdo	En desacuerdo	De acuerdo	Totalmente de acuerdo
1	2	3	4

10. No me siento segura hablando en español en este país.

Totalmente en desacuerdo	En desacuerdo	De acuerdo	Totalmente de acuerdo
1	2	3	4

11. Hablar español es parte de mi identidad.

Totalmente en desacuerdo	En desacuerdo	De acuerdo	Totalmente de acuerdo
1	2	3	4

12. Creo que hablarle a mi bebé en español tiene un impacto positivo en el desarrollo de él/ella.

Totalmente en desacuerdo	En desacuerdo	De acuerdo	Totalmente de acuerdo
1	2	3	4