SRI Education™

A DIVISION OF SRI INTERNATIONAL

Sparking Connections:
Evaluations of Mobile Messaging on Responsive Caregiving

Final Report

February 2022

Appendix A: Systematic Literature Review

The study team conducted a systematic literature review to answer the question, What is the impact of mobile messaging programs on the attitudes, knowledge, and confidence of parents of children 4 years old and younger?

Eligibility Criteria

We considered studies to be eligible for inclusion in the review if they met the following criteria (asterisks indicate eligibility criteria used in the initial screening round):

- Were published in or after 2005.*
- Were written in English.*
- Were a primary research study rather than a meta-analysis or systematic review.*
- Were conducted in the United States, Canada, the United Kingdom, Australia, or New Zealand.*
- Included at least some children who were between 0 and 59 months old. Studies of only the prenatal period were not eligible, but studies of the prenatal period extending into infancy and childhood were eligible.*
- Evaluated an intervention designed to influence parenting outcomes and included a parenting outcome measure. Any parenting outcome was eligible (e.g., responsive caregiving, discipline, vaccination, parenting stress). We defined parenting outcomes as relating in some way to interactions with children, and we excluded interventions focused solely on parents (e.g., parent immunization, smoking cessation).*
- Evaluated an intervention that included a mobile messaging component. We excluded app-based studies that did not include mobile messaging.*
- Included a placebo or no-SMS comparison or control group. A study comparing two active mobile messaging interventions was not eligible unless it also included a comparison or control group.
- Included a quantitative comparison of the treatment and comparison or control group. We were open to computing statistical significance for studies that lacked a significance test but provided sufficient information to do so; however, no studies ultimately met this description.

Studies were eligible regardless of publication status (e.g., unpublished manuscripts were included in the review).

Search

We conducted a systematic search of Google Scholar and ERIC between June and October 2021. We conducted four searches in each database. Each search included one of the four search terms from the following list in combination with the phrase "parent OR mother OR father."

- Mobile OR text message*
- "Short message service" or "Messaging service"
- SMS
- Texting

In addition, all searches of Google Scholar included the search terms -adolescent* and -teen*—the minus signs indicating that documents with these terms should not be included in the search results. We did not include these terms in ERIC searches because that database cannot exclude documents that contain specific terms. We initially chose search terms based on previous systematic literature reviews, and we iterated on those initial terms based on search results.

We also reviewed reference lists in all eligible studies to identify additional relevant studies. In addition, if studies were published before 2020, we used Google Scholar to review documents that cited the study. When more than 100 documents cited one study, we narrowed the results by searching within those documents for the following terms: parent OR mother OR father, -adolescent*, -teen*, and systematic review. Finally, we reviewed references in SRI's research proposal for this study and in other SRI reports about the impact of mobile messaging.

Study Selection

We imported study citations from searches into the reference management software Zotero. In an initial search, four researchers independently screened titles and abstracts for relevance to mobile messaging and parent outcomes. When a researcher determined an article was relevant, they screened it for initial eligibility criteria. The study team then screened articles that met initial eligibility criteria for final eligibility. We used the same process to screen articles we found in reference lists of eligible studies and in Google Scholar results for studies citing eligible studies.

Data Collection Process

We used a standardized form to extract data from studies. We first piloted and revised the form as a team, and then we independently extracted data using the revised form. During this process, we discussed any questions or ambiguities about a study until we reached consensus.

Extracted data included (1) general study information (e.g., country, child age range, outcomes); (2) methods (e.g., randomization, type of comparison group); (3) results for each eligible parent outcome; (4) results of subgroup comparisons conducted on eligible outcomes (e.g., by parent age, native language, or household income). When studies reported on multiple follow-ups, we extracted outcomes from the first time point after the end of the intervention.

Results of Study Screening

The review began with 97 studies. We screened out 47 studies in the initial review for the following reasons (some for multiple reasons):

- Eight studies were conducted in a country that was not eligible for inclusion: two in China and one each in Brazil, Chile, Guatemala, Kenya, and the Philippines.
- Ten studies did not include children in the eligible age range (0 to 59 months old), and four did not report the age range of participating children.
- Twenty studies did not include an eligible parenting outcome or measure: Nine included only child outcomes, seven measured only intervention usability or feasibility, three measured adult outcomes not related to parenting (e.g., parent immunization), and one measured only enrollment in an SMS program.
- Eight studies did not include SMS as part of the intervention. Three of these used SMS but not in an eligible way: One used SMS as a minor scheduling component of a postpartum depression intervention; one focused on an intervention that alerted coaches via text messaging when parents used an online crisis link; and one combined interventions that did and did not include text messaging in the treatment group.
- Nine studies were not original quantitative studies: Five were qualitative, two were study protocols, one was a literature review, and one was a systematic review.

After this initial round of screening, we screened the remaining 50 articles for eligible study designs. We screened out 18 studies for the following reasons:

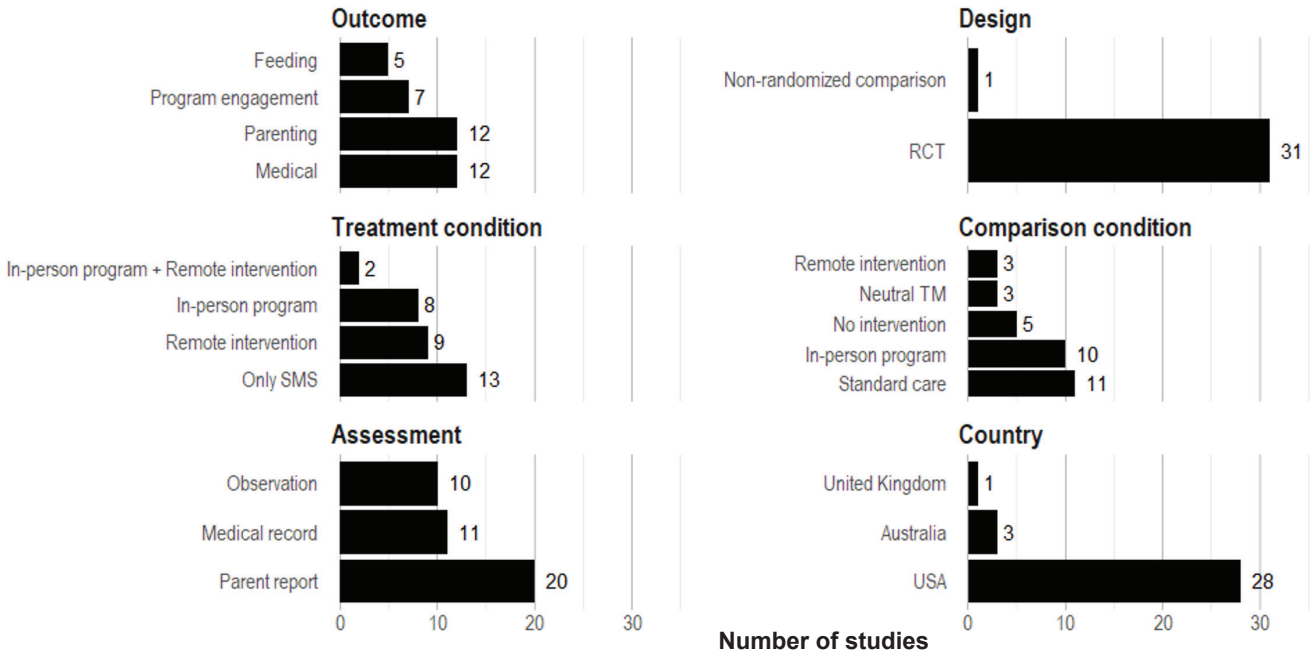
- Six studies did not include a comparison or control group.
- Seven studies did not include eligible research designs: Five did not include a placebo or no-SMS comparison group and instead compared active SMS treatments, and one was a quasi-experiment that did not include pretest data in analyses. One study did not provide sufficient information about the treatment and comparison condition to determine eligibility for inclusion.
- Upon closer examination in the second round of review, three studies did not include an eligible parenting outcome or measure, and one study did not include children in the eligible age range.
- One study did not include tests of statistical significance or sufficient information to compute statistical significance.

After we screened out all ineligible studies, our final sample included 32 eligible studies.

Study Characteristics and Outcomes

Figure A1 displays the design characteristics of the studies included in the final review. We grouped outcomes in the 32 eligible studies into four broad domains: medical, parenting, program engagement, and feeding. Four studies measured outcomes in two of these domains. Most of the studies were conducted in the United States, and all but one were randomized controlled trials. Twenty-eight were published in peer-reviewed journals. The most common treatment condition was SMS only, and the most common comparison conditions were standard care and in-person programs. The most common assessment method was parent report. Studies could include any age range as long as at least some children were 59 months old or younger. The minimum age of children at study start was newborn, and the maximum age was 227 months (18 years 11 months).[1] The average intervention period was 136 days, or 4.5 months (min = 1 day, max = 16 months). The average sample size was 789 participants (*SD* = 1570, min = 15, max = 7,574).

Figure A1. Characteristics of studies included in the systematic review



Note: The number of studies in any chart may sum to more than 32 because a study may fall into multiple categories, for example by assessing multiple outcomes.

1 Age at study start reflects the range between the lowest reported minimum age and the highest reported maximum age at study start. When years were reported, we converted to months assuming that children were between the lowest year plus 0 months and the highest year plus 11 months. When actual child age ranges were not reported, we report child age eligibility criteria. When a grade level was reported rather than an age range, we inferred child age using the 2-year age range typical for enrollment in each grade in the United States, assuming that participants were between the lowest year plus 0 months and the highest year plus 11 months. If a study enrolled pregnant people whose children were born during the intervention period, we report the child age range as 0 months to 0 months.

Table A1 displays characteristics of each study included in the review, and Table A2 displays outcomes by individual study.

We also measured the extent to which studies examined subgroup differences for parents with different education levels, individuals of color, individuals with different household income levels, or individuals who speak languages other than English. No medical or feeding studies examined differences for these subgroups. In a parenting study that included subgroup analyses of the effects of an SMS-enhanced reading program on Latinx parent–child dyads, Jimenez et al. (2021) found significant, positive effects on the home literacy environment but not on shared reading frequency, parent verbal responsivity, or parent reading beliefs. Two studies examined differences in program engagement outcomes for some subgroups. Bigelow et al. (2020) found that parents with postsecondary education used more intervention strategies than parents who did not complete high school, and that parents with annual household incomes of $20,000–$30,000 used more intervention strategies than parents with incomes of less than $10,000 did. In another study examining differences in program engagement outcomes by race and education, Hayward et al. (2021) found no statistically significant differences.

Table A1. Study characteristics

Citation	Country	*N* randomized	Design	Child age (months)	Assessment	Intervention period	Treatment condition	Comparison condition
Ahlers-Schmidt et al., 2012	United States	90	RCT	2 to 6	MR	4 months	SMS	SC
Bigelow et al., 2020	United States	127	RCT	6 to 30	PR, O	8 months	IP	IP
Borrelli et al., 2019	United States	55	RCT	6 to 95	PR	2 months	SMS	NSMS
Carta et al., 2013	United States	371	RCT	42 to 66	PR, O	NA	IP	IP
Chamberlain et al., 2021	United States	644	RCT	36 to 59	PR	7 months	SMS	NI
Coker et al., 2016	United States	251	RCT	0 to 12	MR	1 day	IP + RI	SC
DeCamp et al., 2020	United States	157	RCT	0 to 2	PR, MR	12 months	RI	SC
Gallegos et al., 2014	Australia	234	Non-random	0 to 3	PR	2 months	SMS	SC
Gennetian et al., 2019	United States	210	RCT	36 to 71	PR, O	9 months	RI	IP
Grindal et al., 2020	United States	431	RCT	48 to 71	PR	2 months	RI	RI
Hannan et al., 2016	United States	129	RCT	0 to 0	PR, MR	6 months	RI	SC
Harari et al., 2018	United States	58	RCT	0 to 0	PR, O	NA	IP	IP
Hayward et al., 2021	United States	212	RCT	0 to 215	O	3 months	IP	IP
Hill et al., 2021	United States	621	RCT	36 to 71	O	3.5 months	IP	IP
Hofstetter, DuRivage et al., 2015	United States	5462	RCT	6 to 155	MR	1.75 months	SMS	SC
Hofstetter, Vargas et al., 2015	United States	2054	RCT	9.5 to 10.5	MR	21 days	SMS	SC
Jelley et al., 2016	United Kingdom	150	RCT	28 to 83	PR	4.5 months	RI	NI
Jimenez et al., 2021	United States	160	RCT	6 to 15	PR	1 days	IP	IP
Jones et al., 2014	United States	15	RCT	36 to 107	PR, O	NA	IP + RI	IP
Lefever et al., 2017	United States	371	RCT	36 to 71	O	NA	IP	IP
Martinez-Brockman et al., 2018	United States	174	RCT	0 to 0	PR, O	NA	IP	IP
Mayer et al., 2019	United States	169	RCT	36 to 60	O	1.5 months	RI	RI
McCarter et al., 2019	United States	547	RCT	0 to 0	PR	6.5 months	RI	SC
Menzies et al., 2020	Australia	1594	RCT	0 to 16	MR	16 months	SMS	NI
Niederhauser et al., 2015	United States	57	RCT	0 to 1	PR, MR	4.75 months	SMS	NSMS
Palacios et al., 2018	United States	202	RCT	0 to 2	PR	4 months	SMS	NSMS
Sanders et al., 2012	Australia	116	RCT	24 to 119	PR	3 months	RI	NI
Stockwell et al., 2015	United States	660	RCT	6 to 107	MR	1.13 months	SMS	SC
Stockwell, Kharbanda, Martinez, Lara et al., 2012	United States	7574	RCT	6 to 227	MR	1.25 months	SMS	SC
Stockwell, Kharbanda, Martinez, Vargas et al., 2012	United States	174	RCT	7 to 22	MR	14 days	SMS	SC
Wen et al., 2020	United States	1155	RCT	0 to 0	PR	10 months	RI	RI
York & Loeb, 2014	United States	1031	RCT	48 to 59	PR	8 months	SMS	NI

Note. RCT = randomized controlled trial; Non-random = non-random comparison group; MR = medical record; PR = parent report; O = observation; SMS = SMS only; IP = in-person intervention; RI = remote intervention; SC = standard care; NSMS = neutral SMS message; NI = no intervention.

Table A2. Study outcomes

Citation	Parenting					Medical					Program engagement					Feeding		
	Dysfunctional parenting	Opportunities for learning	Parent-child interaction	Parenting self-efficacy	Parent Psychosocial	Emergency department visits	Oral health	Parent health care engagement	Vaccination	Well visit(s)	Intervention skill practice	Program attendance	Program engagement	Retention in program	Use of intervention strategies	Breastfeeding	Contact with peer breastfeeding counselor	Feeding practices
Ahlers-Schmidt et al., 2012									0									
Bigelow et al., 2020													0		0			
Borrelli et al., 2019							0											
Carta et al., 2013			0		0										+			
Chamberlain et al., 2021			0															
Coker et al., 2016										0								
DeCamp et al., 2020						+		0	0	0								
Gallegos et al., 2014																+		
Gennetian et al., 2019		+										+						
Grindal et al., 2020																		
Hannan et al., 2016					+				+	+								
Harari et al., 2018																0	+	
Hayward et al., 2021													0	0				
Hill et al., 2021												0						
Hofstetter, DuRivage et al., 2015									+									
Hofstetter, Vargas et al., 2015									0	0								
Jelley et al., 2016	0			+														
Jimenez et al., 2021		+	0															
Jones et al., 2014											0	0	+					
Lefever et al., 2017			+												+			
Martinez-Brockman et al., 2018																0	+	
Mayer et al., 2019		+																
McCarter et al., 2019					0													
Menzies et al., 2020									+									
Niederhauser et al., 2015									0									
Palacios et al., 2018																		0
Sanders et al., 2012	+			+	+													
Stockwell et al., 2015									+									
Stockwell, Kharbanda, Martinez, Lara et al., 2012									+									
Stockwell, Kharbanda, Martinez, Vargas et al., 2012									+									
Wen et al., 2020																0		+
York & Loeb, 2014		0	0															

Note. + = Study reported a statistically significant improvement for the treatment group relative to the comparison or control group for at least one outcome in this domain; 0 = Study did not report a statistically significant improvement for the treatment group relative to the comparison or control group for any outcomes in this domain, and it reported no statistically significant difference between the groups for at least one outcome in this domain; Blank cell = Study did not compare or conduct a statistical significance test for differences between the treatment group and comparison or control group on outcomes in this domain.

Appendix B: Methodological Details

Screening and Eligibility of Study Participants

During the recruitment and baseline survey period, the study team used a secure database to track eligibility, survey completion, and electronic gift card distribution. After respondents completed the baseline surveys, we found some respondents to be ineligible for the following reasons: child age was out of the eligible range, one survey was completed for multiple children, and multiple surveys were completed for the same child. When a child's age was out of the eligible range, we emailed the respondent up to two times to verify the age. If a respondent was not able to correct the discrepancy, they were flagged as ineligible, did not receive the post survey, and were excluded from analyses.

When multiple children in the Bright by Text (BBT) study were registered under the same phone number or email address and randomly assigned only to the treatment condition, we sent the post survey to the respondent, and they were retained in analyses. If the respondent's multiple children were assigned to different conditions, we sent the post survey to the first eligible entry but excluded the respondent from analyses because they had received treatment messages.

Some respondents took the baseline survey multiple times for the same child. In these cases, we used responses on the baseline survey to verify that the entry was a duplicate and referred to the first eligible baseline submission for the record that would receive the post survey.

For the BBT study, we screened out 16 treatment participants and 18 control participants after they completed the baseline survey. For the Consejos study, we screened out 24 treatment participants and 15 comparison participants after they completed the baseline survey. All participants determined to be ineligible received an email detailing the study team's decision, were excluded from the baseline sample and all analyses, and did not receive a link to the post survey or the second survey incentive.

Measures

To minimize the burden on parents, we designed the baseline and post surveys to take no more than 10 minutes. We selected questions from existing parent surveys and developed questions when existing instruments did not capture the constructs of interest (Table B1). All questions were translated into Spanish by a translation service, then back-translated and reviewed by two native Spanish-speakers (Mexican dialect) on SRI's staff.

To address the effect of mobile messaging on responsive caregiving, we measured serve and return interactions with four vignettes describing a parent and their child engaging in steps for serve and return interactions. We measured rich language environments with three sets of questions about the frequency of reading, engagement in shared reading, and frequency of labeling. And we included three questions about the parents' warmth, calmness, and feelings of struggling with the child to measure positive affect. We measured attitude toward parenting with one question about the importance of early learning activities, and we developed four questions about parenting knowledge. Finally, we measured confidence in parenting with one question about self-efficacy and three questions about feelings of confidence in supporting reading, math, and social-emotional skills.

To reduce the outcome variables included in analysis—which eases interpretation and avoids numerous comparisons that increase the likelihood of false positives—we conducted factor analysis on the items composing each construct. When the factor analysis yielded an internal reliability coefficient of at least 0.5, indicating that responses to the items were correlated, we averaged the items to form scales. One scale, positive affect, did not show sufficiently high reliability and was removed from analysis. Reliability coefficients (alpha) for BBT and Consejos are in Table B1.

To ease interpretation, we dichotomized the single items measuring frequency of labeling (1–5 times per day or more vs. 2–5 times per week or less), parent attitude toward parenting (strongly agree vs. agree or less), and parent self-efficacy (agree or strongly agree vs. neither agree nor disagree or less).

Analysis

We analyzed data for each program with linear (ordinary least squares) regression for continuous outcomes and logistic regression for dichotomous outcomes. For each outcome in each program, we analyzed three regression models. The first model included the treatment coefficient only, the second model added the respective outcome variable at baseline, and the third model added demographic characteristics. We compared the variance explained by each model (R^2) and chose the model with the highest proportion of variance explained as the final model. For all outcomes in both programs, this was the third model with baseline scores and participant characteristics.

Bright by Text

To analyze data for the BBT randomized controlled trial, we examined the following general model:

$$y_i=\beta_0+\beta_i\, BBT_i+\beta_2\, Pre_i+\beta_2\, \delta_i+\epsilon_i$$

Where y^i is each outcome y for parent i, β_0 is the model intercept, β_1 is the estimate of the treatment impact, β_2 is the corresponding baseline score for a given outcome variable, δ_i is a vector of respondent characteristics and $\boldsymbol{\epsilon}_i$ is the individual error term.

To examine moderation by relevant participant characteristics, we implemented the same

general regression model but added an interaction term between β_2, the treatment indicator, and each characteristic in separate models (i.e., child gender, child age). To examine subgroup effects, we split the sample by household income and child age and re-estimated the regression model within that subgroup.

Consejos de Univision

To analyze data for the Consejos quasi-experimental design, we implemented propensity score weighting with inverse probability weights. The propensity score is the predicted probability of participating in Consejos based on a set of observable characteristics using logistic regression. The weight for participants in the treatment group is 1, and the weight for comparison participants is $\pi/(1 - \pi)$, where π is the propensity score for the *i*'th comparison student. Standard practice is to include in the propensity model any outcome variables that are nonequivalent at baseline, as well as any available demographic or background characteristics (Brookhart et al., 2006; Rubin & Thomas, 1996). Accordingly, we first examined whether the parent survey variables were nonequivalent at baseline. We then estimated the probability (i.e., propensity) that a participant was in the treatment group, as a function of participants' baseline characteristics. We estimated the same general model as for BBT above but included propensity weights in all specifications. For subgroup analyses, we split the sample by household income and child age based on unadjusted characteristics and then re-weighted for each subgroup model.

Sample Characteristics

For both BBT and Consejos, we examined the extent to which respondent characteristics and survey outcomes at baseline were equivalent between the treatment and control or comparison groups. We computed tests of statistical significance (paired t-tests for continuous outcomes and chi-square tests for categorical outcomes) and Cohen's *d* effect size to characterize the magnitude of the effects.

Bright by Text

Sample and Baseline Equivalence

Sample characteristics for BBT participants overall and for the treatment and control groups are in Table B2. No parent survey outcomes or demographic characteristics were statistically significantly different at baseline (all $p > .10$), and the effect sizes were all below the What Works Clearinghouse (2020) threshold for nonequivalence of $d = 0.25$.

Correlations

Bivariate correlations between participants' background characteristics and survey outcomes are in Table B3. We used the results of these correlations to determine the covariates to include in the regression model – any characteristic correlated at least $p < .10$ with any survey outcome was included in the model. All the demographic characteristics were statistically significantly correlated with at least one survey outcome ($p < .10$). These included relationship to child, respondent gender, child gender, child race/ethnicity, parent education, childcare arrangement, home language, household income, child age in months, number of children in the home, and number of adults in the home.

Consejos de Univision

Sample and Baseline Equivalence

Sample characteristics for Consejos participants overall and for the treatment and comparison groups are in Table B4. The parent survey variables were equivalent at baseline—none of the differences between the groups yielded an effect size greater than d = 0.25. We therefore did not use these survey variables in the propensity model.

The background characteristics of the two groups were not equivalent at baseline (Table B4). Participants in the treatment group were more likely than those in the comparison group to be parents than grandparents or other caregivers ($p < .05$, d = -.21), and participants in the treatment group had fewer years of formal education than those in the comparison group had ($p < .001$, d = -0.41). Also, more participants in the comparison group reported a household income higher than $50,000 a year ($p < .01$, d = -0.15) but more treatment group participants reported they did not know their household income (d = 0.37). Comparison group participants reported significantly more children living at home ($p < .05$, d = -0.22), whereas treatment group participants reported significantly more adults living at home ($p < .05$, d = 0.25). Finally, participants in the treatment group reported watching Univision programs for significantly more days in the last week than comparison group participants did ($p < .001$, d = .79). We used all available background characteristics in the propensity model.

Tables B1–B7 provide detail in addition to what is in the main report, including measures, analytic sample characteristics, baseline equivalence, correlations, and summary regression tables.[2]

2 Full regression tables are available upon request.

Table B1. Constructs, items, rating, and outcomes for parent survey instruments

Construct	Items	Rating and scoring	Outcomes in model
Responsive caregiving: serve and return interactions	Four vignettes describing a parent and their child engaging in steps for serve and return interactions. *Adapted from Fisher et al. (2016).*	Rated 6 or more times/day, 1–5 times/day, 2–5 times this week, 1 time this week, did not do this week. Factor analysis supported single scale; Bright by Text (BBT) alpha = 0.78, Consejos de Univision (Consejos) alpha = 0.85.	Serve and return interactions scale (SARIS)
Responsive caregiving: rich language environments	Frequency of reading with child in days. *Adapted from StimQ READ Scale, Mendelsohn et al. (2011).*	Numeric entry.	Weekly days reading
	Frequency of reading with child in minutes. *Adapted from StimQ READ Scale.*	Numeric entry.	Weekly minutes reading
	Frequency of engaging in shared reading. *Adapted from StimQ READ Scale.*	Rated from always to never. Factor analysis supported single scale; BBT alpha = 0.70, Consejos alpha = 0.74.	Shared reading scale
	Frequency of labeling objects, colors, shapes, textures with child. *Adapted from StimQ PIDA Scale, Mendelsohn et al. (2011).*	Rated from 6 or more times/day to did not do this week.	Frequency of labeling
Responsive caregiving: positive affect	Parent struggles with child. *Adapted from Student Teacher Relationship Scale, Pianta (1996).*	Rated from strongly disagree to strongly agree. Factor analysis did not support internal consistency of items; BBT alpha = .51, Consejos alpha = .36. Decided to drop from analysis.	
	Parent has warm moments with child. *Adapted from Multidimensional Assessment of Parenting Scale, Parent & Forehand (2017).*		
	Parent remains calm when child is upset. *Adapted from Healthy Families Parenting Inventory, PCI subscale; Krysik & Lecroy (2012).*		
Attitude toward parenting	Importance of engaging in early learning activities. Study team-developed.	Rated from strongly disagree to strongly agree.	Attitude toward parenting
Parenting knowledge	Knowledge about early development and role of caregiving. Study team-developed.	Rated from strongly disagree to strongly agree. Factor analysis supported single scale; BBT alpha = .67, Consejos alpha = .89.	Parent self-efficacy
	Confidence in teaching early learning. *Adapted from Ready to Learn national survey, Silander et al. (2018).*	Rated from not at all confident to very confident. Factor analysis supported single scale; BBT alpha = .81, Consejos alpha = .82.	Parent confidence scale

Table B2. Descriptive characteristics and equivalence of respondent characteristics and parent survey outcomes at baseline for analytic sample, Bright by Text

	Overall		Control		Treatment		
	N	% or mean (*SD*)	*n*	% or mean (*SD*)	*n*	% or mean (*SD*)	Effect size
Participant characteristic							
Relationship to child							
Parent	379	93.1	193	94.6	186	91.6	-0.12
Other	28	6.9	11	5.4	17	8.4	
Respondent gender							
Male	33	8.1	17	8.3	16	7.9	-0.02
Female	374	91.9	187	91.7	187	92.1	
Child gender							
Male	180	44.2	92	45.1	88	43.4	0.04
Female	227	55.8	112	27.5	115	28.3	
Child race/ethnicity[a]							
Black/African American	37	9.1	16	7.8	21	10.3	0.09
Collapsed	18	4.4	12	5.9	6	3.0	-0.14
Hispanic/Latinx	74	18.2	41	55.4	33	16.3	-0.10
Multi-ethnic/racial	70	17.2	37	18.1	33	16.3	-0.05
White	208	51.1	98	47.1	110	54.2	
Parent education							
Some college or less	66	16.3	34	16.8	32	15.8	-0.03
Associate's degree or higher	339	83.7	169	83.3	170	84.2	
Childcare arrangement							
At-home or family-based care	284	70.5	137	68.2	147	72.8	-0.10
Center-based care	119	29.5	64	31.8	55	27.2	
Home language[b]							
Mostly English	337	82.8	165	80.8	172	84.7	0.10
Any non-English language	70	17.2	39	19.1	31	15.3	
Household income[c]							
Lower than $50,000	174	42.8	83	40.7	91	44.8	
Higher than $50,000	210	51.6	108	52.9	102	50.3	-0.05
Don't know	23	5.7	13	6.4	10	4.9	-0.06
Child age in months	407	26.0 (5.26)	204	25.6 (5.01)	203	26.4 (5.49)	0.14
No. children in home	403	1.80 (0.96)	203	1.74 (0.99)	200	1.86 (0.94)	0.13
No. adults in home	403	2.02 (0.69)	202	2.08 (0.75)	201	1.97 (0.61)	-0.17
Baseline parent survey							
Days read with child per week	406	5.04 (2.02)	202	5.01 (1.97)	204	5.07 (2.06)	-0.03
Minutes read with child per day	406	55.5 (54.3)	202	57.6 (57.8)	204	53.5 (50.6)	0.07
Shared reading scale	406	3.79 (0.81)	202	3.77 (0.81)	204	3.81 (0.82)	-0.06
Frequency of labeling	406	0.73(0.44)	202	0.74 (0.44)	204	0.72 (0.45)	0.04
Parenting self-efficacy	404	0.50 (0.50)	201	0.50 (0.50)	203	0.50 (0.50)	0.01
Parent confidence scale	407	3.71 (0.88)	203	3.75 (0.89)	204	3.68 (0.87)	0.08
Attitude toward parenting	406	0.84 (0.36)	202	0.84 (0.37)	204	0.85 (0.36)	-0.03
Parenting knowledge scale	407	4.84 (0.38)	203	4.86 (0.33)	204	4.82 (0.42)	0.11

Note. Due to rounding, percentages may not add to 100. Effect sizes represent the standardized difference between the treatment and control groups (Cohen's *d*). Tests of significance are t-tests for continuous variable and chi-square for categorical variables. [a] Effect sizes were calculated relative to White children. Collapsed race/ethnicity group included Native American, Asian, West Asian, and South Asian. [b] Non-English languages included Spanish, Filipino, American Sign Language, Armenian, Chinese, Arabic, French, Haitian Creole, Gujarati, German, Nepali, Swahili, and Turkish. [c] Effect sizes were calculated relative to household income < $50K.

Table B3. Bivariate correlations between study outcomes and participant characteristics, Bright by Text

Outcome	Days read with child	Mins read with child	Shared reading scale	Freq. of Labeling	Parent self-efficacy	Parent confidence scale	Attitude toward parenting	Parenting knowledge scale	SARIS
Resp. characteristic									
Parent	0.08	-0.08†	-0.09	0.02	-0.06	-0.11*	-0.09†	-0.09†	0.11**
Resp. female	-0.05	-0.08	-0.08	-0.04	-0.04	-0.09†	0.02	-0.05	-0.07
Child female	-0.04	0.01	-0.07	0.04	-0.03	-0.10†	-0.01	-0.05	-0.06
Child age in months	-0.16**	-0.03	-0.06	-0.03	0.05	-0.00	-0.01	-0.05	-0.04
Child is Hispanic/ Latinx	-0.23***	-0.00	0.03	-0.06	0.04	0.00	-0.09†	-0.05	-0.07
Child is Black	-0.07	0.01	0.05	-0.12**	0.06	0.14**	0.03	0.00	-0.05
Child is multi-ethnic/ racial	-0.04	0.03	-0.01	0.08†	-0.01	0.07	-0.04	0.09†	0.02
Child race/ethnicity other	-0.05	0.00	-0.01	-0.03	-0.04	-0.15**	-0.08	0.01	-0.12
Parent ed. AA degree+	0.19***	-0.20***	-0.05	0.06	0.03	0.00	0.04	0.10**	0.10*
Child attends center-based care	-0.01	-0.12*	0.02	-0.04	-0.04	0.03	-0.01	0.06	-0.04
Home language mostly English	0.19*	0.02	-0.05	0.03	-0.04	0.03	0.13***	-0.01	0.10*
HH income $50K+	0.21***	-0.20***	-0.11*	0.01	-0.04	-0.13**	0.08	0.00	0.02
Resp. does not know HH income	-0.02	0.13**	0.07	0.05	-0.03	0.04	-0.12*	-0.05	0.00
No. children in HH	-0.06	0.00	-0.09†	-0.06	0.04	0.10*	0.00	-0.02	-0.09†
No. adults in HH	0.04	-0.05	-0.07	0.03	-0.04	-0.15**	-0.04	0.03	-0.071

Note. Resp. = respondent; AA = associate's degree; HH = household; Freq. = frequency; SARIS = serve and return interactions scale.

† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table B4. Descriptive characteristics and equivalence of respondent characteristics and parent survey outcomes at baseline for analytic sample, Consejos de Univision

	Overall		Comparison		Treatment		
	N	% or mean (*SD*)	*n*	% or mean (*SD*)	*n*	% or mean (*SD*)	Effect size
Relationship to child							
Parent	338	91.1	198	93.8	140	87.5	-0.21*
Other	33	8.9	13	6.2	20	12.5	
Respondent gender							
Male	23	6.2	10	4.8	13	8.1	0.13
Female	346	93.8	199	95.2	147	91.9	
Child gender							
Female	190	51.5	103	49.3	87	54.4	-0.10
Male	179	48.5	106	50.7	73	45.6	
Child race/ethnicity							
Hispanic/Latinx	345	92.7	192	91.0	153	95.0	0.15
Not Hispanic/Latinx	27	7.3	19	9.0	8	5.0	
Parent education							
High school diploma or less	189	52.1	91	43.5	98	63.6	-0.41***
Some college or more	174	47.9	118	56.5	56	36.4	
Childcare arrangement[a]							
Center-based care	81	22.0	48	22.8	33	20.9	-0.05
At-home or family-based care	260	70.5	148	70.1	112	70.9	
Don't know	28	7.6	15	7.1	13	8.2	0.04
Home language							
Mostly English	14	3.8	8	3.8	6	3.7	0.50***
Mostly Spanish	169	45.4	74	35.1	95	59.0	
Mix of English and Spanish	189	50.8	129	61.1	60	37.3	
Household income[b]							
Lower than $50K	253	68.2	153	72.5	100	62.5	
Higher than $50K	51	13.8	33	15.6	18	11.3	-0.15***
Don't know	67	18.1	25	11.9	42	26.3	0.37***
Child age in months	372	26.0 (5.23)	211	25.9 (5.15)	161	26.2 (5.34)	0.05
No. children in home	367	2.59 (1.24)	211	2.70 (1.27)	156	2.43 (1.19)	-0.22*
No. adults in home	369	2.19 (0.86)	210	2.10 (0.72)	159	2.31 (0.99)	0.25*
Days watched Univision	370	3.94 (2.30)	210	3.20 (2.29)	160	4.90 (1.94)	0.80***
Days read with child per week	362	3.05 (1.73)	159	2.85 (1.68)	203	3.21 (1.75)	-0.21
Minutes read with child per day	224	78.7 (81.8)	116	83.7 (92.0)	108	73.3 (69.2)	0.13
Shared reading scale	369	3.78 (0.89)	159	3.74 (1.00)	210	3.82 (0.81)	-0.09
Frequency of labeling	365	0.63 (0.48)	155	0.65 (0.48)	210	0.61 (0.49)	0.06
Parent self-efficacy	365	0.60 (0.49)	154	0.61 (0.49)	211	0.59 (0.49)	0.04
Parent confidence scale	368	3.57 (0.93)	157	3.45 (0.99)	211	3.67 (0.87)	-0.24*
Attitude toward parenting	365	0.77 (0.42)	155	0.74 (0.44)	210	0.80 (0.40)	-0.14
Parenting knowledge scale	365	4.63 (0.85)	154	4.56 (1.00)	211	4.68 (0.72)	-0.15

Note. Percentages may not add to 100 due to rounding. Effect sizes represent the standardized difference between the treatment and control groups (Cohen's d). Tests of significance are t-tests for continuous variable and chi-square for categorical variables. a Effect size calculated relative to at-home or family-based care. b Effect size calculated relative to household income < $50K.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table B5. Bivariate correlations between study outcomes and participant characteristics, Consejos de Univision

Outcome	Days read with child	Mins read with child	Shared reading scale	Freq. of Labeling	Parent self-efficacy	Parent confidence scale	Attitude toward parenting	Parenting knowledge scale	SARIS
Resp. characteristic									
Relationship parent	-0.06	-0.02	-0.05	0.03	-0.12	-0.05	0.02	0.07	0.123*
Respondent female	-0.10*	0.01	-0.10	-0.01	0.01	-0.02	-0.16	-0.06	-0.14**
Child female	-0.07	0.03	-0.05	-0.02	-0.04	0.01	-0.02	-0.03	-0.03
Child age in months	0.06	0.03	0.07	-0.03	0.06	0.01	-0.01	-0.01	0.01
Child is Hispanic/ Latinx	-0.10+	0.06	0.00	0.00	0.06	-0.06	-0.03	-0.06	-0.03
Parent ed some college+	0.05	-0.17**	-0.07	-0.07	-0.05	0.13*	0.13	0.17**	0.11*
Child attends center-based care	0.07	-0.06	0.02	0.06	0.00	0.08	0.00	-0.05	0.02
Resp. does not know care arrangement	-0.06	0.08	-0.08	-0.02	0.04	-0.03	-0.08	-0.06	0.01
Home language mostly Spanish	-0.03	0.08	0.04	-0.03	0.11*	-0.09+	-0.14**	-0.11*	-0.13*
HH income $50K+	-0.01	-0.10+	-0.09+	-0.10+	-0.08	0.06	0.04	0.10*	0.01
Resp. does not know HH income	-0.05	0.10+	0.01	0.04	0.05	-0.09	-0.09	-0.08	-0.15**
No. children in HH	-0.01	0.09	-0.01	-0.05	0.08	0.07	-0.11	0.02	0.03
No. adults in HH	-0.08	0.00	-0.08	-0.01	-0.01	-0.07	-0.11	0.00	0.04
No. days watched Univision in last week	0.15**	0.22***	0.10+	0.06	0.12*	-0.08	0.01	-0.04	-0.09+

Note. Resp. = respondent; HH = household; Freq. = frequency; SARIS = serve and return interactions scale.

† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table B6. Summary of regression models on all outcomes, Bright by Text

Outcome	Treatment coefficient	*SE*	Effect size
Serve and return interactions scale	< 0.01	0.07	< 0.01
Days read with child	< 0.01	0.14	< 0.01
Minutes read with child	0.72	5.31	0.01
Shared reading scale	0.04	0.06	0.05
Frequency of labeling[a]	-0.24	0.28	-0.15
Parent self-efficacy[a]	-0.12	0.25	-0.07
Parent confidence scale	< 0.00	0.06	< 0.01
Attitude toward parenting[a]	-0.25	0.34	-0.15
Parenting knowledge scale	-0.03	0.04	-0.08
CDI total words	0.58	8.78	0.02
CDI combinations	0.12	0.18	0.14

Note. Each row represents a separate regression model predicting the outcome with treatment group status, corresponding baseline measure, and covariates. Covariates included respondent is parent, respondent is female, child is female, child age in months, child race/ethnicity, parent education is associates degree or higher, child attends center-based care, language at home is mostly English, household income is more than $50K, respondent does not know household income, number of children in home, and number of adults in home. Effect size is Hedge's g for continuous outcomes and Cox's Index for dichotomous outcomes.

[a] Logistic regression.

Table B7. Summary of regression models on all outcomes, Consejos de Univision

Outcome	Treatment Coefficient	*SE*	Effect size
Serve and return interactions scale	-0.10	0.09	-0.12
Days read with child	0.18	0.15	0.10
Minutes read with child	40.2***	10.3	0.56
Shared reading scale	0.17**	0.06	0.24
Frequency of labeling[a]	0.07	0.28	0.04
Parent self-efficacy[a]	0.48[†]	0.29	0.29
Parent confidence scale	0.01	0.08	0.01
Attitude toward parenting[a]	0.29	0.33	0.17
Parenting knowledge scale	0.06	0.09	0.07

Note. Each row represents a separate regression model predicting the outcome with treatment group status, corresponding baseline measure, and covariates. Covariates included respondent is parent, respondent is female, child is female, child age in months, child is Hispanic/Latinx, parent education is some college or higher, child attends center-based care, parent does not know care arrangement, language at home is mostly Spanish, household income is more than $50K, respondent does not know household income, number of children in home, number of adults in home, and number of days watched Univision in last week. Each model includes propensity weights calculated using these covariates listed in the previous sentence. Effect size is Hedge's g for continuous outcomes and Cox's Index for dichotomous outcomes.

[a] Logistic regression.

[†] $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

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