

Evaluation of the National Expansion of PBS SoCal's Family Math Initiative

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This report, updated in October 2026, includes minor corrections to the reported effect sizes.

PBS SoCal

FAMILY + MATH

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Executive Summary

PBS SoCal originally designed Family Math to provide families in the Greater Los Angeles Area and Southern California with bilingual, free, play-based tools to engage in math learning in everyday contexts. After expanding the initiative nationwide, **PBS SoCal partnered with the Stanford Center on Early Childhood (SCEC) to evaluate the implementation and impact of Family Math in Alabama and Arizona**. When designing this mixed-methods study, we prioritized honoring the "plug and play" nature of Family Math to understand what real-world implementation and impact looked like across the different local contexts of three stations (Alabama Public Television, Arizona PBS, and PBS SoCal). Between September 2024 and January 2025, we collected pre- and post-series data from 218 participants, including parents/caregivers of children ages 2-5 and educators/providers who work with children in that age group. We also collected post-series data from 17 partner station education leads and workshop facilitators. Additionally, we conducted a "dscout" diary study with seven families to understand how they continued to engage with Family Math at home after the end of a workshop series. Evaluation participants primarily identified as people of color, and close to one-third reported a primary home language other than English. Most participants were parents, and many educators/providers reported working in Head Start or licensed home-based child care settings.

Overall, this study reveals promising evidence about the implementation and impact of Family Math:

- **Participants reported significant increases from pre- to post-series in all three core metrics (math confidence, math positivity, and knowledge of foundational math skills).** When disaggregating by participant type, both parents/caregivers and educators/providers reported significant increases in the core metrics. When disaggregating by site, results were mixed, with the largest increases in core metrics in Arizona. Overall, our findings indicate some replicability of Family Math in Alabama and Arizona.
- The significant increases in the core metrics are noteworthy, as **participants had high ratings at the pre-series time point** and were potentially already very engaged in children's math learning.
- Participants reported **noticing improvements in their children's math skills**, particularly in the Family Math topic of number sense & counting, after engaging in a workshop series.
- Facilitators and education leads reported that they were well-equipped to successfully implement the workshop series. They also reported **a strong desire for their stations to continue offering Family Math** and prioritizing early math development moving forward.
- Given that we collected data from educators/providers, station education leads, and workshop facilitators (in addition to data from parents/caregivers), our findings are broader than the scope of the current Family Math Theory of Impact (TOI). **Our findings suggest that various components of the TOI could also be applied to these other stakeholders.** Accordingly, PBS SoCal can adjust the TOI and Family Math evaluation tools (e.g., pre- and post-workshop surveys) to reflect educators'/providers' engagement with the program. Further, these changes would align with PBS stations' interest in expanding the target audiences of Family Math.

Our findings show that we can collect meaningful information about an early childhood initiative even if the implementation of that initiative is not identical from site to site. **Flexible evaluation design can facilitate a deeper understanding of how different communities adapt an initiative to meet the unique strengths and needs of their local contexts.** As PBS SoCal continues expanding Family Math implementation, opportunities exist to further build strong evidence for impact.

Introduction

PBS SoCal is home to the Public Broadcasting Service (PBS) for the Greater Los Angeles Area and Southern California. PBS SoCal created the Family Math program to help families, particularly those who are socioeconomically disadvantaged, with children ages 2 to 5 to discover the joy of math in everyday experiences by providing in-person and digital programming and resources in both English and Spanish. PBS SoCal partnered with the Stanford Center on Early Childhood (SCEC) to evaluate the national expansion of Family Math. An initiative of the Stanford Accelerator for Learning, the SCEC leverages the current moment of revolutionary science and deep, omnidirectional collaboration across sectors to change the way that research in early childhood is conducted, communicated, and utilized, with the overarching goal of ensuring that each and every child thrives from the start.

This report outlines the background of the Family Math initiative and its evidence base, the journey to and decision making about a mixed-methods study conducted by the SCEC from 2024–25, the main findings from the study, opportunities for further exploration, and key takeaways about **the experiences of parents/caregivers, educators/providers, workshop facilitators, and partner station education leads in Alabama, Arizona, and California who participated in Family Math**.

Background of the Program and the Study

Launched in 2019, the Family Math initiative is one of PBS SoCal's early learning programs. Family Math is a research-based, multi-platform, bilingual initiative (offered in both English and Spanish) that focuses on building math positivity, confidence, and knowledge of foundational math skills for families, particularly those who are socioeconomically disadvantaged, with children ages 2 to 5. The initiative emerged from a co-design process – which began in Compton, California, and expanded to other communities in PBS SoCal's region – of exploring what parents/caregivers need to support their young children in math (Early Learning Lab & PBS SoCal, 2020).

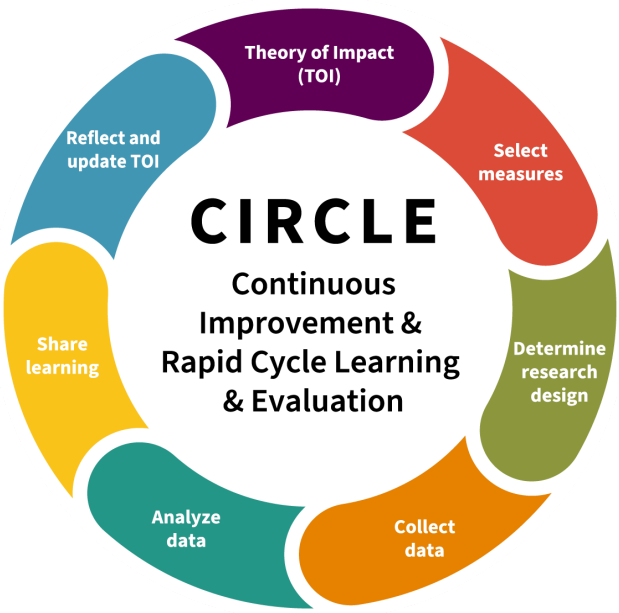
Research shows that when compared to other skills, **children's early math skills have the greatest predictive power on their later achievement**, not only in mathematics but also in other subjects and grade retention (Claessens & Engel, 2013; Duncan et al., 2007). Growing evidence suggests that a socioeconomic gap in math knowledge is present in preschool years, with children from lower income families receiving less support for early math development than their middle-class peers do (Starkey et al., 2004). In turn, unequal access to opportunity can lead to underperformance on kindergarten readiness tests (PBS SoCal, 2025). However, research also suggests that children who are socioeconomically disadvantaged experience more gains from early math interventions than their middle-class peers do (Starkey et al., 2004). Moreover, parental engagement in early math learning helps grow children's foundational math skills (Mayer et al., 2023). This context informs Family Math's focus on families who are socioeconomically disadvantaged and on parent-child interactions.

Family Math equips parents/caregivers with strategies and resources to facilitate meaningful math experiences at home with their young children (PBS SoCal, 2025). To be responsive to families' needs, PBS SoCal offers a variety of ways to engage in Family Math, including through in-person and virtual workshops, printable materials, digital activities, instructional videos, and broadcast promotional spots. To implement their early learning work, including Family Math, PBS stations often collaborate with local organizations; these community partners typically include schools, libraries, nonprofits, and other kinds of organizations that serve children and families. Family Math enables stations and their

partners to work with parents/caregivers to support children's early math development through play. The initiative emphasizes how learning and teaching math can be simple, fun, and embedded in everyday contexts by helping families recognize how many of the daily routines and activities they are already doing are great opportunities to introduce early math concepts. Through this initiative, PBS SoCal aims to build a math community, expand ideas of math, and develop informal ways for families to engage in positive math activities with young children.

Family Math's Existing Evidence Base

Quantitative pre-workshop and post-workshop survey data that PBS SoCal has collected since the inception of Family Math in 2019 indicate that parents/caregivers who participate in Family Math workshops show an average increase in math positivity by 11%, math confidence by 14%, and knowledge of foundational math skills by 13% in the Greater LA Area and Southern California (PBS SoCal, 2025). These local data points are from ongoing pre- and post-workshop surveys, with a mix of surveys administered at the beginning and end of one-time workshops as well as surveys administered at the beginning and end of multiple-workshop series. PBS SoCal's qualitative data indicate that Family Math resources and content can foster opportunities for family bonding and also help parents/caregivers become more attuned to how their children experience and enjoy learning math (PBS SoCal, 2025). Family Math equips participants with skills to weave math into daily routines, like discussing shapes they see on their way to the grocery store (PBS SoCal, 2025). Parents/caregivers reported greater recognition of where math can fit into their everyday lives, with many noting that they now see math everywhere they go (PBS SoCal, 2025). For example, in interviews and focus groups, three mothers reported that over the course of their participation in a five-week, virtual Family Math workshop series (the Parent Academy in fall 2022), they felt more confident in their ability to have conversations that involve math during everyday activities, such as cooking, baking, or laundry (PBS SoCal, 2023). Additionally, in longitudinal interviews, three mothers reported that over the course of their participation in a four-week, virtual workshop series (the "Peg + Cat" Family Community Learning Workshops in spring 2023), they noticed their children continuing to practice what they learned and also noticed growth in their children's math skills (PBS SoCal, 2023).



Road to Evaluation

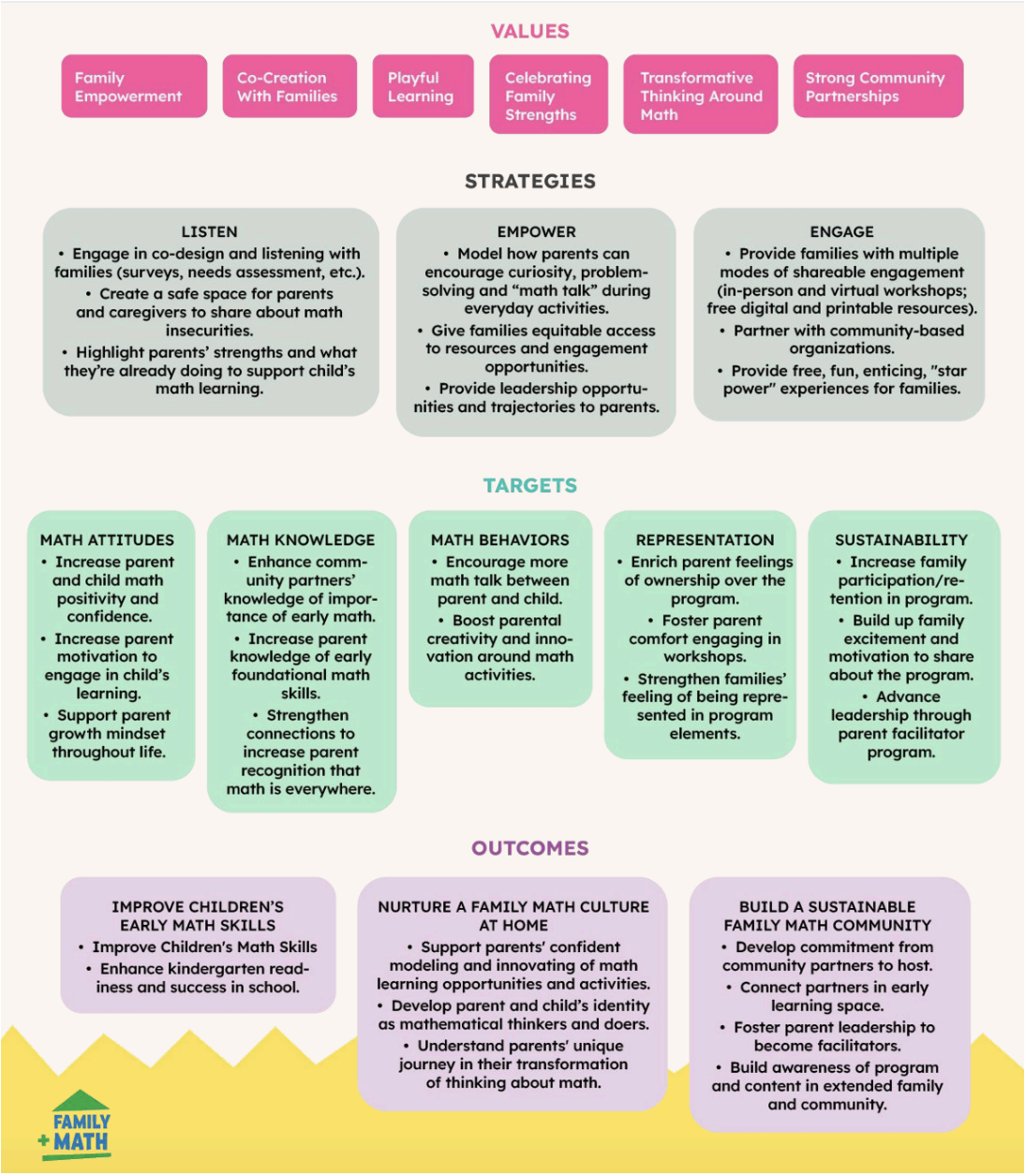
In the 2023–24 fiscal year, PBS SoCal expanded Family Math nationwide by providing grants to 10 stations. Through the Family Math Station Grant Initiative, PBS SoCal boosted partner stations' capacity by equipping them with resources to enhance their early learning math programs. PBS SoCal also provided grantees with ongoing technical assistance with evaluation and with gathering mixed-methods data to use for fundraising after the end of the grant period.

In 2022, PBS SoCal partnered with the SCEC to begin the external evaluation journey of Family Math. The CIRCLE team, the evaluation and

technical assistance arm of the SCEC, uses a robust approach to evidence building that is rooted in equity-centered and community-engaged principles. The Continuous Improvement Rapid Cycle Learning and Evaluation (CIRCLE) Framework helps programs understand their implementation and impact and effectively drives improvements at the program and systems level. **The CIRCLE team moves beyond seeking to "prove" that programs work and instead seeks to learn about "how" and "for whom" programs are working.** Using this continuous improvement approach, the CIRCLE team aims to empower communities to tell their stories of impact and advocate for their needs.

Theory of Impact

Guided by the CIRCLE Framework, the CIRCLE team conducted workshops with the PBS SoCal team in fall 2022 to identify key programmatic elements and related goals of Family Math across all implementation sites, ultimately resulting in the Family Math Theory of Impact (TOI). **This TOI articulates the why of Family Math (*values*), what happens within the initiative (*strategies*), what results are expected because of these activities (*targets*), the broader goals of these activities (*outcomes*), and the factors that affect who benefits most or least from the initiative (*moderators*).** The TOI directly informed the design of this evaluation. The graphic below includes the *values*, *strategies*, *targets*, and *outcomes* of Family Math. The *moderators* are: prior experience with PBS workshops or events, parents' history of formal schooling, family history and culture (e.g., immigrant status), language of service delivery, level of sense of responsibility/motivation to teach and support child, income, family time and capacity to participate, and community partnership commitment.



Methodology

Study Design and Focus

The current study focused on the foundational modes of Family Math programming: workshops and activities. The creators of Family Math initially wanted to provide a space exclusively for parents/caregivers, and workshops provided this space (PBS SoCal, personal communication, February 12, 2025). The implementation of workshops has evolved over time. PBS SoCal first implemented workshops as a series, such as the Parent Academy and "Peg + Cat" Family Community Learning Workshops. Recently, PBS SoCal shifted the focus to one-off workshops that each cover a narrower array of topics, since this stand-alone model is more conducive to scalability.

The creators of Family Math designed activities to help parents/caregivers continue math engagement at home with their children. Tarana Khan, PBS SoCal's research and evaluation manager, describes how the activities reinforce parents'/caregivers' learnings from the workshops:

> *"In the workshop, they do an activity as well … If it's a sorting workshop, both activities would cover sorting … We hope that [the take-home activity] is something that they can go back to … [and that] they can see the simplicity of the materials … It's supposed to be … inspiring and [help] continue that fun and that playfulness."*

For this evaluation, the PBS SoCal and CIRCLE teams identified Family Math workshops as the component on which to focus data collection efforts across implementation sites given the strong existing evidence base in California around parents'/caregivers' reported changes in math positivity, confidence, and knowledge, as well as the foundational nature of the workshops within the universe of Family Math content. We identified activities as a secondary component on which to focus data collection given that they provide an opportunity to see how families apply Family Math at home after the workshops. Finally, although Family Math began as an initiative specifically for families, this evaluation provided an opportunity to expand the workshops in particular to educators/providers. Rosemary Miller, PBS SoCal's senior director of early learning, discusses the station's motivation to learn more about the potential benefits of the initiative for the early childhood workforce:

> *"Other stations … did have some educators involved in the study … That's going to be a big learning for us … seeing how it resonated with educators, and what kind of educators they incorporated into the Family Math work. Were they traditional classroom or … more informal educators? … In the early childhood space … it's super fragmented."*

Identifying Sites for Workshop Implementation

To Dr. Khan, expanding the initiative to other states and evaluating the impact of it in those states "felt like a very natural next step" because PBS SoCal already had proof of concept for the initiative locally:

> *"We know that it works for the communities that we serve, and we have enough data to show year after year … We wanted to expand [Family Math] and share it out … The other stations that are participating in the evaluation, they serve different types of communities … There was a big interest [in knowing]: 'Do we see … similar effect[s] there?'"*

From the cohort of 10 stations involved in the Family Math Station Grant Initiative, PBS SoCal selected Alabama Public Television (APT) and Arizona PBS as the two sites (in addition to PBS SoCal) to participate in this study. APT and Arizona PBS, due to their particular grant requirements, were already implementing Family Math workshops at the level needed for this evaluation (PBS SoCal, personal communication, 2025). The three stations also differ from each other in terms of PBS licensing: APT is a statewide licensee, Arizona PBS is a university licensee, and PBS SoCal is a community licensee. Including all three stations in this study provided an opportunity to assess the sustainability of Family Math for different types of licensees, as licensee type shapes funding in major ways. There are also differences in the stations' local contexts in terms of demographics and math performance, with Arizona PBS serving the Navajo people and APT operating in a state whose average fourth grade math score ranked last among all states in the 2019 National Assessment of Educational Progress (Alabama State Department of Education, 2025).

In order to reflect the true "plug and play" nature of Family Math, the evaluation approach was flexible to adapt to each site's unique contexts and priorities. When developing Family Math, PBS SoCal "didn't want to tell [parents] 'this is what you need to do'" (PBS SoCal, personal communication, 2025). Instead, PBS SoCal and its collaborators utilized co-design to ensure that families felt "supported and empowered to become leaders in their child's mathematics education" (Khan & Beltrán-Grimm, 2020). Similarly, to make this study reflective of the real-world implementation of Family Math, the three sites could adapt the workshops to suit the different populations they serve and fit within the stations' existing operations. While we provided goal numbers for participants, we did not set targets for numbers of series. Further, PBS SoCal did not set guardrails for sites' partner development processes, because they wanted to see who stations would pick and with whom they felt Family Math aligned (PBS SoCal, personal communication, 2025). Additionally, stations and their community partners could choose which four workshop topics from six options (measurement, number sense & counting, patterns, shapes, sorting & collecting, and spatial sense) they wanted to focus on for each series they hosted. Whereas APT selected the four workshop topics and order of the workshops that all facilitators would follow, Arizona PBS and PBS SoCal did not. Workshop facilitation also varied depending on sites' capacity, with facilitators ranging from core staff members to community members. Each facilitator received training prior to running any workshops. In addition to providing these opportunities for sites to adapt the series to meet their communities' unique strengths and needs, the CIRCLE team prepared an evaluation protocol to ensure consistency in key areas. Namely, we provided instructions about reporting workshop information (e.g., topic covered) and attendance, administering the surveys by displaying QR codes on slides (and/or by sharing links), and answers to FAQs that facilitators could use to field participants' questions in a uniform manner.

Data Collection Instruments

This mixed-methods, quasi-experimental study utilized a combined pre/post and post-only design. We collected data using six surveys that we administered in both English and Spanish online via Qualtrics between September 2024 and January 2025. Given that we used a Family Math workshop series (four workshops) as the unit of program participation, we administered a pre-series survey at the start of the first workshop in the series and a post-series survey at the end of the fourth workshop in the series to parents/caregivers and educators/providers. There were both overlapping and distinct questions in the pre- and post-series surveys depending on whether respondents participated in the workshops because of their role as a parent/caregiver for a child/children between the ages of 2 and 5 or as part of their job as an educator/provider in the early childhood field. Participants received a $5 electronic gift card for each completed survey, consistent with the SCEC's standard participant compensation rate for a survey with an average duration of 5–10 minutes.

Parents/caregivers who completed the pre-series survey also had the opportunity to express interest in participating in a follow-up, in-depth evaluation activity on a mobile research app called dscout, which occurred between November 2024 and February 2025. On dscout, parents/caregivers shared videos of themselves completing a take-home Family Math activity with their children. Additionally, parents/caregivers recorded videos of themselves sharing their reflections about both the take-home activity and the workshop series. This form of data collection, in which participants can record their experiences, is called a dscout diary study. While the pre- and post-series surveys provided an understanding of parent/caregiver engagement in Family Math in out-of-home settings, the purpose of the dscout diary study was to see how families engaged in Family Math at home. Given that the dscout

diary study was more time intensive (i.e., estimated time commitment of 20–30 minutes, not including prep time for the take-home activity) than the pre- and post-series surveys, we incentivized participation with a $50 electronic gift card. Similar to the "plug and play" approach of stations choosing which workshops they would host, parents/caregivers could choose which activity to do with their children from three options. The CIRCLE and PBS SoCal teams selected the three activity options based on the ones that involved materials that families were most likely to already have at home: counting book (librito de números), maracas and shakers (maracas de patrones), and colorful collages (collage de colores).

To understand Family Math implementation and adaptation at each site, we administered post-series feedback surveys to both station education leads and workshop facilitators. Lastly, we interviewed the PBS SoCal team in February 2025 to glean contextual information about the journey of Family Math, from the program's local roots to national expansion, to incorporate throughout this report.

Analysis Plan

We cleaned quantitative data from all Qualtrics surveys in SPSS and analyzed the data in R. For the quantitative questions from the workshop facilitator and education lead feedback surveys, we conducted descriptive analyses. For the quantitative questions on the pre- and post-series surveys, we conducted both quantitative trend analyses and non-parametric statistical hypothesis testing to assess changes from pre to post and their statistical significance. Given the non-normality of the variables in question, we used non-parametric Wilcoxon signed-rank tests to compare paired data without assuming normality. For significant results ($p < .05$), we also calculated effect sizes and include here effect size ranges for reference: very small effect ($r < .1$); small effect but potentially meaningful ($.1 < r < .3$); medium effect, moderate impact ($.3 \leq r < .5$); large effect, strong difference ($r \geq .5$).

We conducted qualitative thematic analyses of all data from the dscout diary study as well as of open-ended responses from the pre- and post-series surveys, workshop facilitator feedback surveys, and education lead feedback surveys. To ensure consistency and rigor in our process, all coders achieved inter-rater reliability testing scores of 71% or above prior to beginning coding. We used the Dedoose coding software and deductive thematic analysis techniques (Bingham & Witkowsky, 2022). We developed our codebooks based on the Family Math TOI, survey items from the data collection instruments, and preliminary quantitative findings. We refined the codebooks during early stages of coding to incorporate further examples and clarity.

Overview of Study Participants

The majority of all workshop participants opted into the evaluation. We define opting in as taking a pre-series survey, a post-series survey, or both. Table 1 provides an overview of the total number of unique participants in the evaluation and relevant demographics. In total, **7 parents/caregivers completed the dscout diary study** (four from California, who participated in Spanish, and three from Arizona, who participated in English). In all, **60.7% of partner station stakeholders across all three sites** opted into the evaluation, with a **50% opt-in rate among education leads** and **63.6% opt-in rate among workshop facilitators**. Opt-in rates varied by station; whereas the majority of Alabama education leads and facilitators opted in (83.3%), less than half of education leads and facilitators in Arizona (42.9%) and California (44.4%) did.

Below, we report on the demographics of our **Family Math workshop evaluation participants**.

Table 1. Family Math workshop participants in the evaluation (N = 218)

Participant type	Total	Participated in English	Participated in Spanish	AL	AZ	CA
Educators/providers	62	48	14	13	44	5
Parents/caregivers	156	123	33	71	37	48
All participants	218	171	47	84	81	53

In all, 81.7% of all evaluation participants identified with communities of color (subgroups outlined in Table 2). **The most common self-reported race/ethnicity among participants was Hispanic/Latinx** for the sample as a whole (36.7%), Arizona (46.9%), and California (73.6%). The majority of Alabama participants identified as Black/African American (69%).

Table 2. Race/ethnicity of Family Math workshop participants in the evaluation (N = 218)

Race/ethnicity	# of participants	% of all participants	% of AL participants	% of AZ participants	% of CA participants
American Indian or Alaska Native	14	6.4%	0%	17.3%	0%
Asian	9	4.1%	2.4%	7.4%	1.9%
Black or African American	74	33.9%	**69%**	8.6%	17%
Hispanic or Latinx	80	**36.7%**	3.6%	**46.9%**	**73.6%**
Middle Eastern, West Asian, or North African	1	0.5%	0%	1.2%	0%
White	29	13.3%	19%	14.8%	1.9%
Did not report	*11*	*5.1%*	*6%*	*3.7%*	*5.7%*

In terms of primary home language, 31.2% of all participants reported a language other than English. The most common reported primary home language by participants was English for the sample as a whole (69.7%), Alabama (96.4%), and Arizona (65.4%). **The majority of California participants reported that they primarily speak Spanish at home (66%).** In Table 3, the total for the count of participants is greater than the sample size of 218 and the total for the proportion of participants is greater than 100% because some participants listed more than one primary home language.

Table 3. Primary home language of Family Math workshop participants in the evaluation (N = 218)

Primary home language	# of participants	% of all participants	% of AL participants	% of AZ participants	% of CA participants
Chinese	1	0.5%	1.2%	0%	0%
English	152	**69.7%**	**96.4%**	**65.4%**	34%
German	2	0.9%	0%	2.5%	0%
Hmong	1	0.5%	0%	1.2%	0%
Marathi	1	0.5%	0%	1.2%	0%
Navajo	2	0.9%	0%	2.5%	0%
Polish	1	0.5%	0%	1.2%	0%
Spanish	59	27.1%	2.4%	27.2%	**66%**
Tagalog/Filipino	1	0.5%	0%	0%	1.9%
Did not report	*1*	*0.5%*	*0%*	*1.2%*	*0%*

We asked parents/caregivers participants about their parent/caregiver role and the number of children they brought to the Family Math workshop series. From those who responded, the **majority were parents** across the full sample (88.9%) and at each site (Alabama = 87%; Arizona = 86%; California = 94%). **Grandparents also participated** in the workshops (full sample = 6.5%; Alabama = 9%; Arizona = 6%, California = 4%). The **majority of parents/caregivers brought one child to the workshops** across the sample as a whole (55.1%) and two sites (Alabama = 59%; California = 69%). In Arizona, most parents/caregivers reported that they did not attend the workshop series with children (38%).

We asked educators/providers about their educational attainment (shown in Table 4), professional role (shown in Table 5), and work setting (shown in Table 6). **Associate degree was the most common reported highest level of education across the full sample** (22.6%) and in Arizona (25%), while in Alabama, some college, associate degree, and bachelor's degree were tied for most common (all 23%). In California, the most common reported highest level of education was less than high school (40%).

Table 4. Educational attainment of educator/provider participants in the evaluation (N = 62)

Highest level of education	% of all educators / providers in study	% of educators / providers in AL	% of educators / providers in AZ	% of educators / providers in CA
Less than high school	3.2%	0%	0%	**40%**
Some high school	3.2%	0%	5%	0%
High school diploma or equivalency (GED)	17.7%	15%	18%	20%
Some college	17.7%	**23%**	18%	0%
Associate degree	**22.6%**	**23%**	**25%**	0%
Bachelor's degree	19.4%	**23%**	18%	20%
Master's degree	11.3%	8%	11%	20%
Doctorate or professional (PhD, MD, JD, DDS, etc.)	1.6%	8%	0%	0%
Not listed	*3.2%*	*0%*	*5%*	*0%*

With regard to professional role, the most common response was home-based child care provider for the sample as a whole (32.8%) and Alabama (62%). In Arizona and California, most educators/providers wrote in their professional roles. In Arizona, the most common answer choice selected from the specific roles provided was home-based child care provider (26%). In California, there was a tie between home-based child care provider (20%) and director (20%).

Table 5. Professional role of educator/provider participants in the evaluation (N = 61)

Professional role	% of all educators / providers in study	% of educators / providers in AL	% of educators / providers in AZ	% of educators / providers in CA
Assistant teacher	9.8%	8%	12%	0%
Teacher	14.8%	23%	14%	0%
Director	18%	8%	21%	20%
Home-based child care provider	**32.8%**	**62%**	26%	20%
Not listed	*24.6%*	*0%*	***28%***	***60%***

With regard to work setting, **among the educators/providers who selected one of the settings provided, most reported working in Head Start or licensed home-based child care settings**.

Table 6. Work setting of educator/provider participants in the evaluation (N = 62)

Work setting	% of all educators / providers in study	% of educators / providers in AL	% of educators / providers in AZ	% of educators / providers in CA
State Pre-K	3.2%	0%	5%	0%
Head Start or Early Head Start	**29%**	23%	30%	**40%**
Licensed home-based child care	27.4%	**69%**	18%	0%
Unlicensed home-based child care	6.5%	0%	7%	20%
Private center-based child care	8.1%	8%	9%	0%
Not listed	*25.8%*	*0%*	***32%***	***40%***

Findings

We organize the findings of this evaluation by components from the Family Math TOI: *moderators*, *strategies*, *targets*, and *outcomes*. The TOI in its current iteration primarily focuses on parents/caregivers, given the historical focus of Family Math; our inclusion of educators/providers and partner station stakeholders in our data collection allows for potential expansion of the TOI.

It is important to note that the sample size (i.e., denominator) for each of the findings below is dependent on how many people answered the particular survey item(s) associated with that finding. Given the voluntary nature of the study, participants could choose to skip any question they did not wish to answer; the only required questions were those needed to track participants and send incentives to them. Pre and post comparisons are only included for participants who completed both the pre- and post-series surveys. We excluded the participants who identified differently across the two timepoints (pre/post) for the graphs that show mean levels disaggregated by participant type (parent/caregiver and educator/provider), which is why the sample sizes for those graphs are smaller than the total number of people who responded to those questions.

Moderators

We collected data on three out of the eight *moderators* on the Family Math TOI.

Language of Service Delivery

In this evaluation, this moderator corresponded with the language of each workshop's content (slide decks and activities) and facilitation. **Sites hosted 89 workshops in total, including 57 in Alabama, 20 in Arizona, and 12 in California.** As shown in Table 7, the most common workshop language was English for APT (100%) and Arizona PBS (80%) and Spanish for PBS SoCal (66.7%). Arizona PBS (20%) and PBS SoCal (33.3%) also hosted bilingual workshops in both English and Spanish.

The number of attendees varied from workshop to workshop and not all attendees opted into the evaluation. Nevertheless, it is interesting to note that the rate of English-only workshops (82%) is not far off from **the proportion of participants who opted into the evaluation in English (78.4%, as shown in Table 1)**. Similarly, the rate of Spanish-only or bilingual workshops (18%) is close to **the proportion of participants who opted into the evaluation in Spanish (21.6%, as shown in Table 1)**.

Table 7. Language of workshop content and facilitation (total number of workshops = 89)

Workshop language	# of workshops	% of all workshops	% of AL workshops	% of AZ workshops	% of CA workshops
English only	73	**82%**	**100%**	**80%**	0%
Spanish only	8	9%	0%	0%	**66.7%**
Bilingual (English and Spanish)	8	9%	0%	20%	33.3%

Level of Sense of Responsibility/Motivation to Teach and Support Child

Overall, the mean proportion of parents/caregivers who agreed or strongly agreed that they have a responsibility to support their children's math development in the pre-series survey was 97.4%, with individual sites' pre-series means ranging from 95% to 100%. A lack of variability here precludes additional exploration of how this moderator may affect impact. **These findings suggest that the parents/caregivers in our study had a very high sense of responsibility to support their children's math learning prior to their participation in the workshops.**

Family Time and Capacity to Engage

Overall, the mean proportion of participants who agreed or strongly agreed that they support children's math learning in many ways in the pre-series survey was 94.2%, with individual sites' pre-series means ranging from 91% to 100%. A lack of variability here precludes additional exploration of how this moderator may affect impact. **These findings suggest that participants in our study had the time and capacity to engage in children's math learning in many ways prior to attending the workshops.**

Strategies

Our findings relate to seven of the nine *strategies* on the Family Math TOI. Following the structure of the TOI, we organize *strategies* by the overarching categories of ***listen***, ***empower***, and ***engage***. **Overall, we heard from Family Math workshop participants, facilitators, and education leads that Family Math strategies were implemented as expected across sites.**

LISTEN

Create a safe space for parents and caregivers to share about math insecurities.

In the post-series survey, **93.8% of all participants agreed or strongly agreed that the Family Math workshops were a safe space to share their insecurities around math**. This high level of agreement was consistent across all three sites (Alabama = 93%; Arizona = 93%; California = 97%).

Highlight parents' strengths and what they're already doing to support their child's math learning.

Using open-ended questions in the pre- and post-series surveys, we asked parents/caregivers about how they support children's math development. **Both parents/caregivers and educators/providers**

shared examples related to incorporating math into daily routines and using play-based activities to do so. Multiple educators/providers also mentioned using games, puzzles, and manipulatives to facilitate math learning. Multiple parents/caregivers described engaging in math at home, while helping their children with homework, cooking, and reading, and also outside of home, while grocery shopping. These examples across both the pre- and post-series surveys indicate that the workshops reinforced many of the math engagement strategies that participants were already using:

> *"During activities, during meals by counting fruits or throughout the day, mathematics can be implemented." – AZ educator/provider*

In the post-series survey, **91% of educators/providers agreed or strongly agreed that Family Math concepts directly relate to the math curriculum they use**. This high level of agreement was consistent across all three sites (Alabama = 100%; Arizona = 88%; California = 100%).

EMPOWER

Model how parents can encourage curiosity, problem solving, and "math talk" during everyday activities.

Participants' open-ended responses in the post-series survey indicate that they gained new strategies from the workshops about incorporating math into daily routines:

> *"I learned a lot of new fun ways to incorporate math learning through these sessions. We count every day, we do simple addition and subtraction with pieces of fruit or small foods, we do comparisons between big/small, heavy/light, long/short." – AL parent/caregiver*

> *"I learned so many activities that will help my children better understand and have fun." – AZ parent/caregiver*

> *"I teach her numbers in songs, when I am in the kitchen she participates in counting food and in games." – CA parent/caregiver*

Give families equitable access to resources and engagement opportunities.

All (100%) facilitators agreed or strongly agreed that **the Family Math workshops were designed and structured in a way that was accessible** to participants. All (100%) education leads agreed or strongly agreed that the series **reached the intended audience of socioeconomically disadvantaged families with children ages 2 to 5**.

ENGAGE

Provide families with multiple modes of shareable engagement (in-person and virtual workshops; free digital and printable resources).

Given the focus of this evaluation on workshops and activities in particular, we can speak to metrics on those modes of Family Math engagement. Sites hosted 89 workshops in total and recorded over 300 participants in attendance logs. All workshop participants also engaged with activities, given the structure of the workshops. Additionally, seven parents/caregivers participated in follow-up data collection through the dscout diary study, which included doing a take-home activity with their children.

Partner with community-based organizations.

All (100%) education leads reported that their **stations partnered with other organizations to complete the Family Math workshop series**. Stations collaborated with a broad range of local partners, including a preschool managed by a public university, a statewide project that supports family child care providers with attaining national accreditation, and a grassroots early learning coalition with strong community ties. All (100%) education leads and facilitators agreed or strongly agreed that **they were provided with all necessary curriculum materials** (e.g., workshop slides, facilitator guides, video links, and game links) to implement the series. All (100%) facilitators agreed or strongly agreed that **the resources were user-friendly**, and that it was easy to access and find the information they needed. Lastly, all (100%) facilitators agreed or strongly agreed that **they felt well supported by their station to facilitate the series**.

Provide free, fun, enticing, "star power" experiences for families.

One Arizona parent's/caregiver's reflection about the take-home activity that they completed with their child for the dscout diary study illustrates the accessible and entertaining nature of Family Math:

> *"Today, we chose to do the maracas, and he had so much fun. And I liked that I got to just spend some quality time one on one with him, doing something creative. I liked how … we were given activities that we could choose from, based on what we had around the house. And we didn't have exactly everything, but we were able to pull something together … I enjoyed it."*

Targets

Our findings relate to 10 of the 14 *targets* on the Family Math TOI. Following the structure of the TOI, we organize *targets* by the overarching categories of ***math attitudes***, ***math knowledge***, ***math behaviors***, ***representation***, and ***sustainability***. Our analyses indicate that workshop participants reported **statistically significant increases from pre** (i.e., their first workshop) **to post** (i.e., their last workshop) **for multiple targets, including all three core Family Math metrics** (***math positivity***, ***math confidence***, and ***knowledge of foundational math skills***).

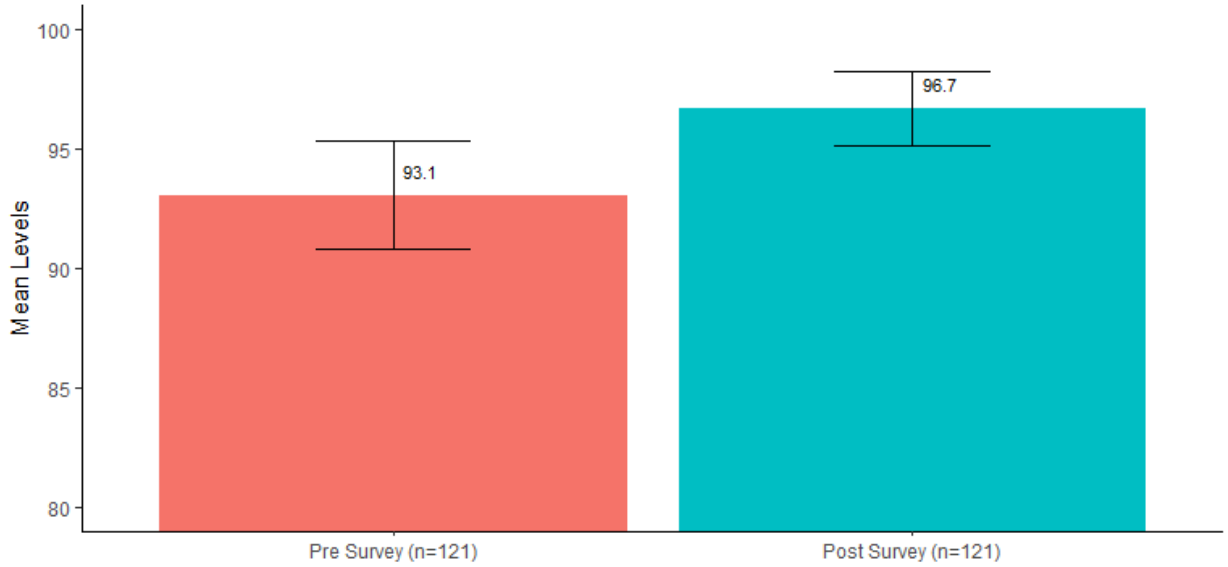
MATH ATTITUDES

Increase parent and child math positivity and confidence.

In alignment with PBS SoCal's extant pre/post survey item, we assessed participants' ***math positivity*** by asking them about the extent to which helping children learn math was a fun and enjoyable experience. We converted participants' responses to this question into one 0–100 composite score.

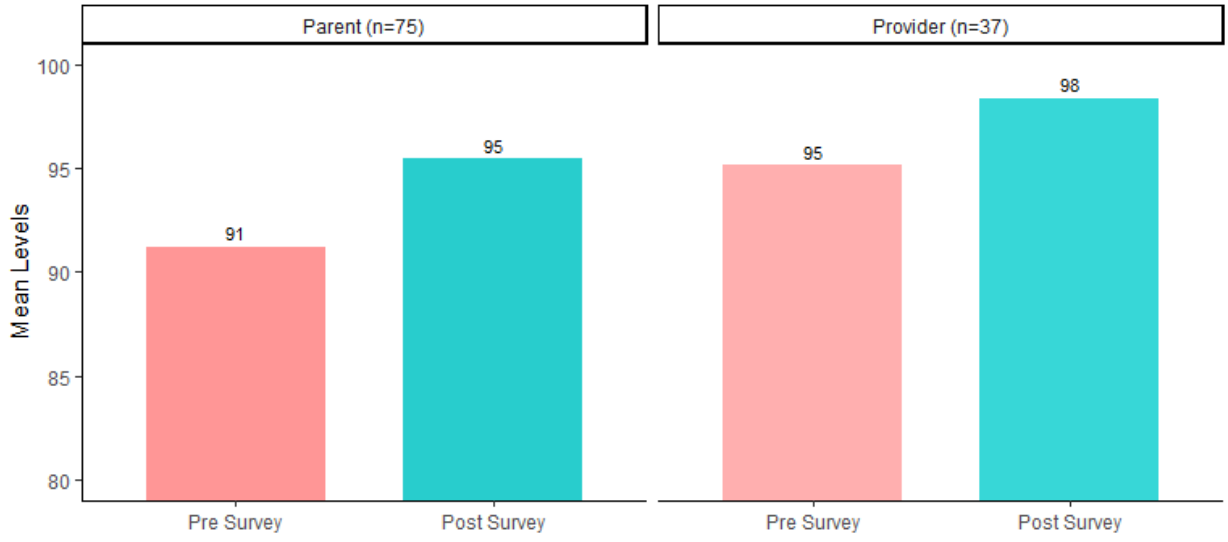
Overall, **participants reported significantly higher math positivity in the post-series survey than in the pre-series survey ($p < .001$, $r = .56$)**, as shown in Figure 1.

Figure 1. Math positivity among participants who took both pre and post surveys, all sites (N = 121)



When disaggregating by participant type, **both parents/caregivers and educators/providers reported a significantly higher level of math positivity from pre to post** (parents/caregivers = 91 to 95, $p < .005$, r = .59; educators/providers = 95 to 98, $p < .05$, r = .60).

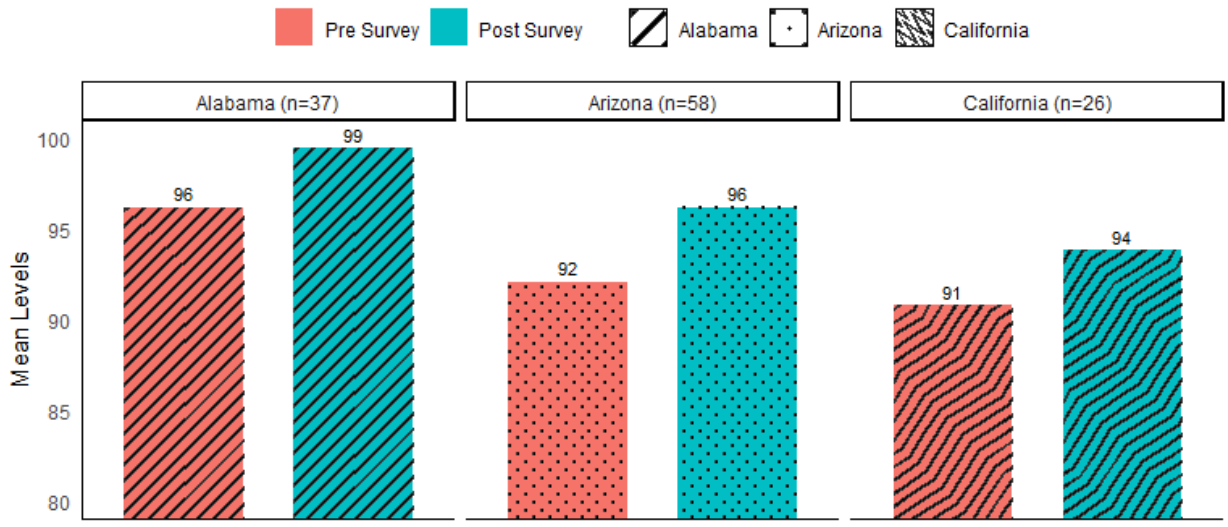
Figure 2. Math positivity among participants who took both pre and post surveys, by participant type (N = 112)



At the site level, **participants in Alabama and Arizona reported a significantly higher level of math positivity from pre to post** (Alabama = 96 to 99, $p < .01$, r = 1[1]; Arizona = 92 to 96, $p < .05$, r = .57). In California, the difference in pre and post math positivity scores was not significant (91 to 94, $p = .15$).

[1] Ceiling effects (i.e., high scores in the pre-series survey) and few non-zero differences in pre to post account for this very high effect size.

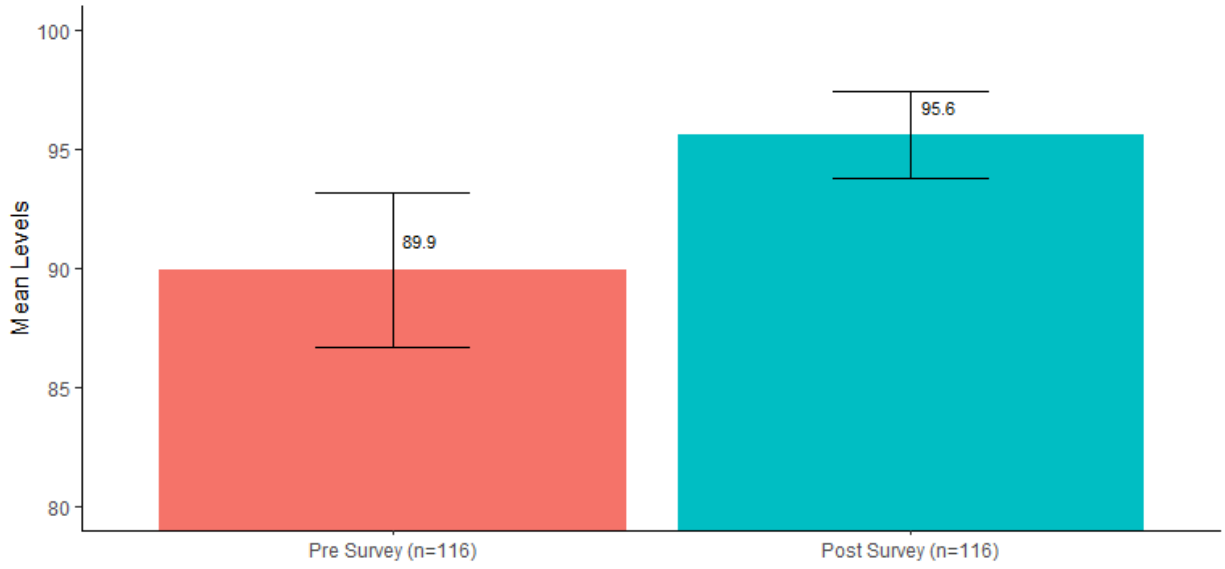
Figure 3. Math positivity among participants who took both pre and post surveys, by site (N = 121)



In alignment with PBS SoCal's extant pre/post survey item, we assessed participants' ***math confidence*** by asking how confident they felt about helping children with the six possible Family Math workshop topics (measurement, number sense & counting, patterns, shapes, sorting & collecting, spatial sense), with one question per topic. We converted participants' responses to these six questions into one 0–100 composite score.

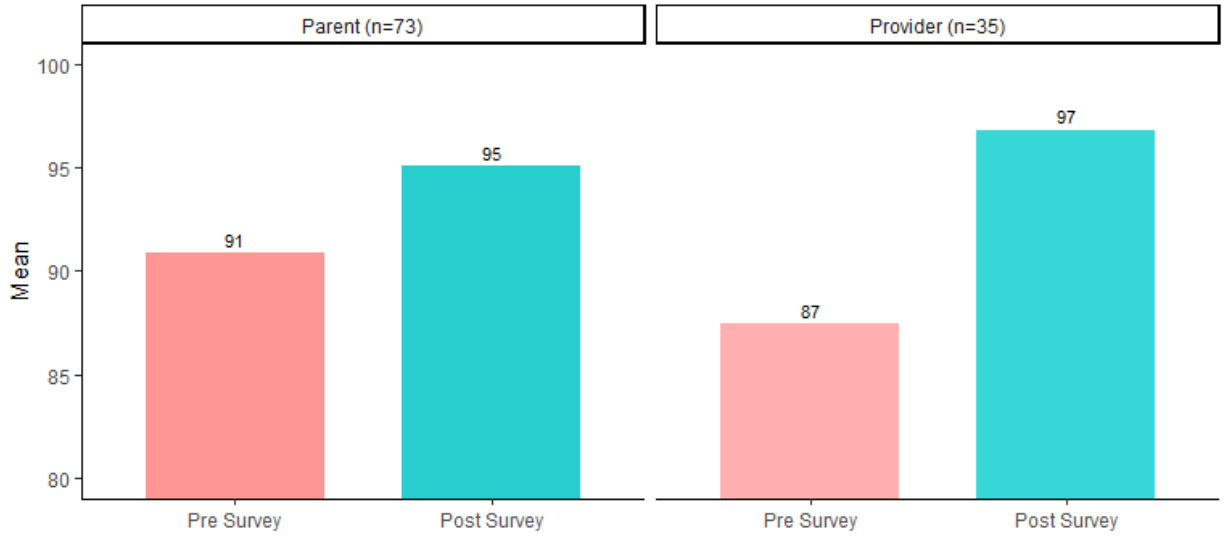
Overall, **participants reported significantly higher math confidence in the post-series survey than in the pre-series survey ($p < .001$, $r = .50$)**, as shown in Figure 4.

Figure 4. Math confidence among participants who took both pre and post surveys, all sites (N = 116)



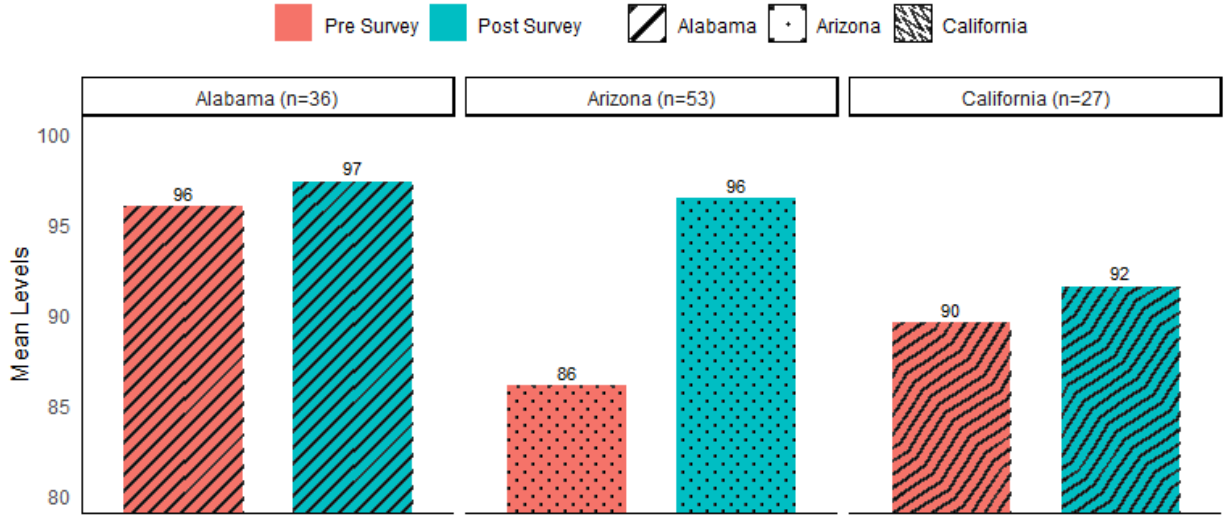
When disaggregating by participant type, **both parents/caregivers and educators/providers reported a significantly higher level of math confidence from pre to post** (parents/caregivers = 91 to 95, $p < .05$, r = .44; educators/providers = 87 to 97, $p < .005$, r = .74).

Figure 5. Math confidence among participants who took both pre and post surveys, by participant type (N = 108)



At the site level, **participants in Arizona reported a significantly higher level of math confidence from pre to post** (86 to 96, $p < .001$, r = .64). In Alabama and California, the differences in pre and post math confidence scores were not significant (Alabama = 96 to 97, $p = .34$; California = 90 to 92, $p = .24$).

Figure 6. Math confidence among participants who took both pre and post surveys, by site (N = 116)



Increase parent motivation to engage in child's math learning.

In the post-series survey, **all (100%) parents/caregivers agreed or strongly agreed that the Family Math workshops made them more motivated to engage in their children's learning**.

In the post-series survey, **95% of educators/providers agreed or strongly agreed that the Family Math workshops made them more motivated to engage in teaching early math concepts**. This high level of agreement was consistent for Alabama (100%) and Arizona (97%). There was a relatively lower level of agreement in California (50%), but it is important to note that only five educators/providers in California opted into the surveys and only two answered this question about motivation.

All (100%) facilitators reported that, **as a result of being a Family Math workshop facilitator, they felt motivated or highly motivated to continue supporting early math learning efforts**.

MATH KNOWLEDGE

Enhance community partners' knowledge of the importance of early math.

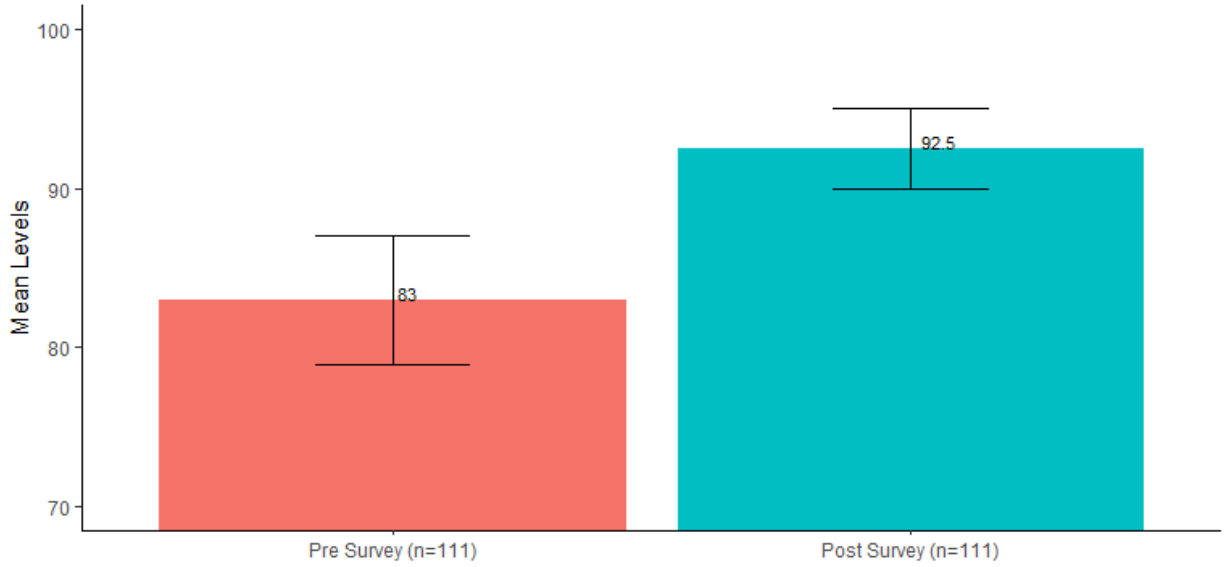
All (100%) facilitators and education leads agreed or strongly agreed that, **as a result of their participation in the Family Math workshop series, they felt more knowledgeable speaking about the importance of children's early math skills**.

Increase parent knowledge of early foundational math skills.

In alignment with PBS SoCal's extant pre/post survey items, we assessed participants' ***math knowledge*** by asking them three questions: 1) the extent to which they believe they have a good understanding of what children should be learning at their age/grade level, 2) the extent to which they believe they are capable of teaching children the math concepts that will prepare them for success in school, and 3) how confident they are in their ability to have conversations that involve math while doing everyday routines with children (e.g., cooking, shopping, etc.). We converted participants' responses to these three questions into one 0–100 composite score.

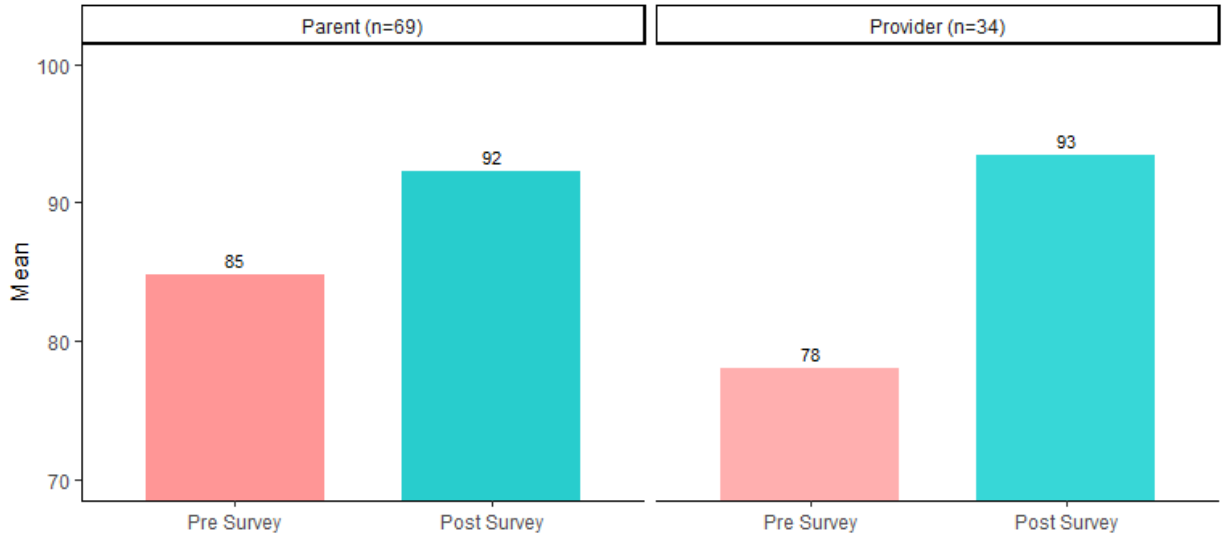
Overall, **participants reported significantly greater knowledge of foundational math skills in the post-series survey than in the pre-series survey ($p < .001$, $r = .53$)**, as shown in Figure 7.

Figure 7. Math knowledge among participants who took both pre and post surveys, all sites (N = 111)



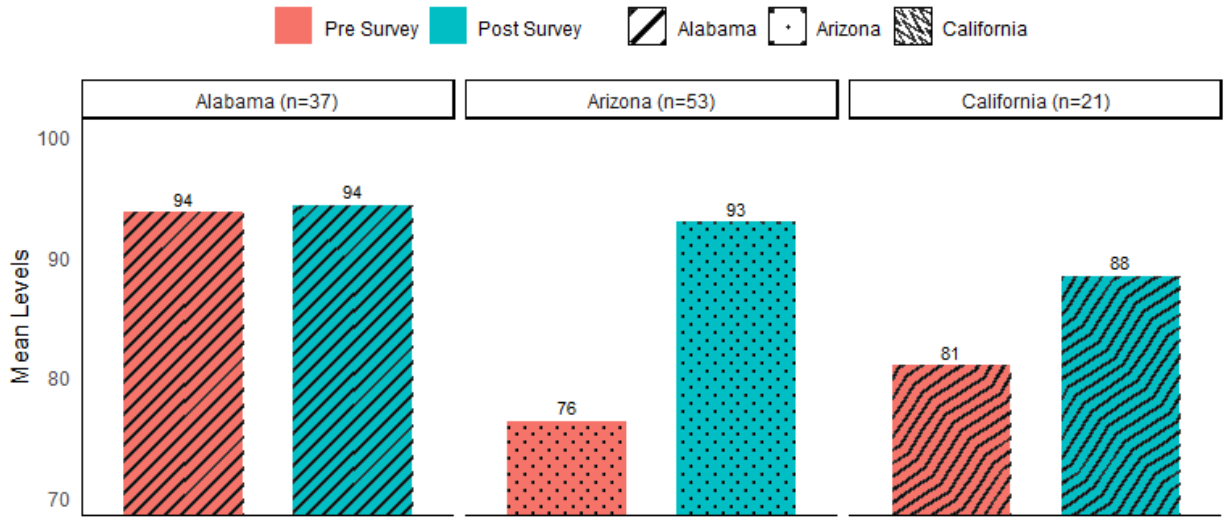
When disaggregating by participant type, **both parents/caregivers and educators/providers reported a significantly higher level of math knowledge from pre to post** (parents/caregivers = 85 to 92, $p < .005$, r = .56; educators/providers = 78 to 93, $p < .001$, r = .78).

Figure 8. Math knowledge among participants who took both pre and post surveys, by participant type (N = 103)



At the site level, **participants in Arizona and California reported a significantly higher level of math knowledge from pre to post** (Arizona = 76 to 93, $p < .001$, r = .66; California = 81 to 88, $p < .05$, r = .51). In Alabama, there was no change in math knowledge scores from pre to post (94 to 94, $p = .47$).

Figure 9. Math knowledge among participants who took both pre and post surveys, by site (N = 111)



Strengthen connections to increase parent recognition that math is everywhere.

We assessed participants' awareness of the ubiquitous nature of math through two questions: 1) their likelihood of recognizing math concepts in daily life, and 2) their likelihood of seeing math everywhere.

Overall, there was a significant increase from pre (88.3%) to post (100%) in the proportion of participants who reported that it was moderately or very true that they recognize math concepts in daily life ($p < .001$, r = .81). When disaggregating by participant type, both parents/caregivers and educators/providers reported significant increases from pre to post in their recognition of math concepts in daily life (parents/caregivers = 84% to 100%, $p < .001$, r = .79; educators/providers = 94% to 100%, $p < .005$, r = .83). When disaggregating by site, there were also significant increases from pre to post in participants' recognition of math concepts in daily life in Arizona (83% to 100%, $p < .001$, r = .87) and California (90% to 100%, $p < .01$, r = 1[2]). The pre to post increase in Alabama was not significant (95% to 100%, $p = .29$).

Overall, there was a significant increase from pre (91%) to post (99.1%) in the proportion of participants who reported that it was moderately or very true that they see math everywhere ($p < .005$, r = .56). When disaggregating by participant type, parents/caregivers reported a significant increase from pre to post in their likelihood of seeing math everywhere (88% to 100%, $p < .01$, r = .65. The pre to post increase reported by educators/providers was not significant (94% to 97%, $p = .05$). When disaggregating by site, there was also a significant increase from pre to post in participants' likelihood of seeing math everywhere in Arizona (89% to 98%, $p < .005$, r = .70). Pre to post increases were not significant in Alabama (95% to 100%, $p = .21$) or California (90% to 100%, $p = .29$).

MATH BEHAVIORS

Encourage more math talk between parent and child.

A California parent/caregiver who participated in dscout spoke about the growth they have seen in their child's interest in parent-child math talk since participating in the workshop series:

> *"I have noticed changes … I would say to [child's name], 'what is two plus two?' So, she could have said 'four,' but no. She would get bored with that subject, of me sitting down, and asking her questions like that … Nowadays, through games, songs or simply the fact that now she tells me on her own, mommy, 'let's play counting tassels.' Tassels are little fuzzy things that we have, that are made of wool … And she says, 'let's play,' so she divides them into colors and then she starts to count them, and she also divides them by sizes … So, she starts counting them and it's a game … I feel that she is motivated now to sit down and participate with me in any activity."*

Similarly, in open-ended responses in their feedback survey, facilitators noted **spending time with children and learning about ways to support children's math development as the biggest benefits** of Family Math for parents/caregivers in particular.

Boost parental creativity and innovation around math activities.

In the post-series survey, **91% of educators/providers agreed or strongly agreed that the Family Math workshops gave them ideas for new lesson plans**. This high level of agreement was consistent for Alabama (100%) and Arizona (91%). There was a relatively lower level of agreement in California

[2] Ceiling effects (i.e., high scores in the pre-series survey) and few non-zero differences in pre to post account for this very high effect size.

(50%), but it is important to note that only five educators/providers in California opted into the surveys and only two answered this question.

Facilitators named having the **opportunity to interact with parents/caregivers and enhanced teaching/support with teaching as the biggest benefits** of Family Math for educators/providers. A facilitator in California shared an example of feedback they received from an educator/provider:

> *"Grateful to be reminded of how valuable math is and to learn and teach in the most fun way."*

Similarly, in an open-ended response, an educator/provider workshop participant in Arizona shared,

> *"This … workshop helped me to teach math in a fun way. And [the workshop facilitator] opened a panorama of ideas for the lesson plan."*

Overall, 64.7% of facilitators and education leads reported that they adapted or innovated the Family Math workshop resources. This high level of adaptation/innovation was consistent for Alabama (70%) and California (75%). In Arizona, 33.3% of facilitators and education leads reported adapting or innovating the workshop resources. In terms of specific changes, three facilitators noted that **they made the activities more age appropriate for the toddlers who attended**.

REPRESENTATION

Foster parent comfort engaging in workshops.

In the post-series survey, **all (100%) participants agreed or strongly agreed that the Family Math workshops were fun and engaging**. In the dscout diary study, an Arizona parent/caregiver shared how comfortable it made them to have someone who shared their linguistic background present:

> *"It was [an] engaging, good atmosphere with friendly people, [who] were all interested in how to help to integrate math learning in early ages … We were connecting to each other. Some of them were teachers, some of them were parents … I was able to connect with some German-speaking person who was new there, and I speak German, so it was nice to have somebody in common to help you out when … some words are failing."*

SUSTAINABILITY

Increase family participation/retention in the program.

Overall, 92.9% of facilitators who facilitated Family Math workshops for families agreed or strongly agreed that **the content was useful for families**. Overall, all (100%) facilitators who facilitated Family Math workshops for educators/providers agreed or strongly agreed that **the content was useful for educators/providers**. An Arizona parent/caregiver who participated in the dscout diary study expressed interest in staying involved and shared ideas for improving the program:

> *"I liked everything about it and would like to perhaps join again next time in the future. What could be better is using music more to sing along with numbers and using our hands or other things such as toys in the workshop."*

When asked about feedback they received from participants, a facilitator in Arizona said,

> *"Educators expressed interest in participating in more workshops."*

Build up family excitement and motivation to share about the program.

A parent/caregiver in California who participated in the dscout diary study shared their positive experiences with the take-home activity, how they are applying their takeaways from the workshops, and **their inclination to let others know about Family Math**:

> *"We were working on the book of numbers. For me, it was a very nice experience because I had a base on how to work. We added some ideas that we came up with … So, I really liked that because [my 5-year-old son] wanted to work … until he got to number 10. He made 10 stars … Looking for resources in the community was when I found the PBS … workshops … focused on math. That has helped me a lot because [before] I … didn't think about [how] we can find math anywhere … Something that I have learned a lot and that I have liked a lot is to work on patterns. It has been very nice every time we go for a walk. We always say what we see, what geometric figure we see, how many cars we see, what colors they are, and all that has helped me to increase my mathematics a lot …. I have enough tools and the necessary knowledge to be able to help him strengthen his education … And every time I have the opportunity, I always share it with my family friends, because they are workshops where we really learn a lot."*

Outcomes

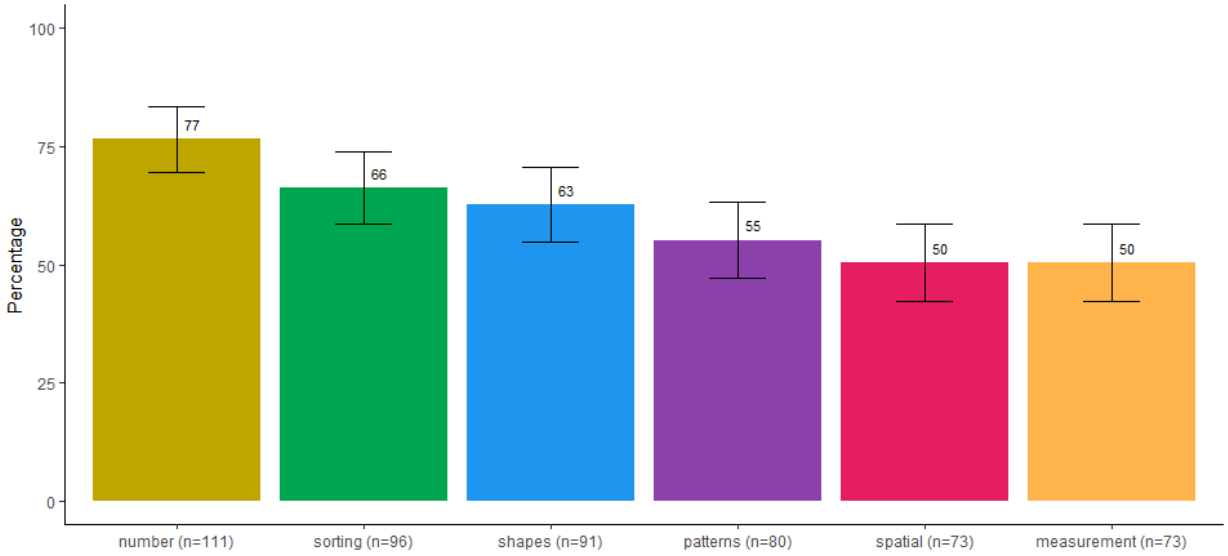
Our findings relate to seven of the nine *outcomes* on the Family Math TOI. Following the structure of the TOI, we organize *outcomes* by the overarching categories of ***improve children's early math skills***, ***nurture a Family Math culture at home***, and ***build a sustainable Family Math community***.

IMPROVE CHILDREN'S EARLY MATH SKILLS

In the post-series survey, **91.4% of parents/caregivers agreed or strongly agreed that their children's math skills improved through participating in Family Math workshops**. This high level of agreement was consistent across all three sites (Alabama = 91%; Arizona = 88%; California = 96%).

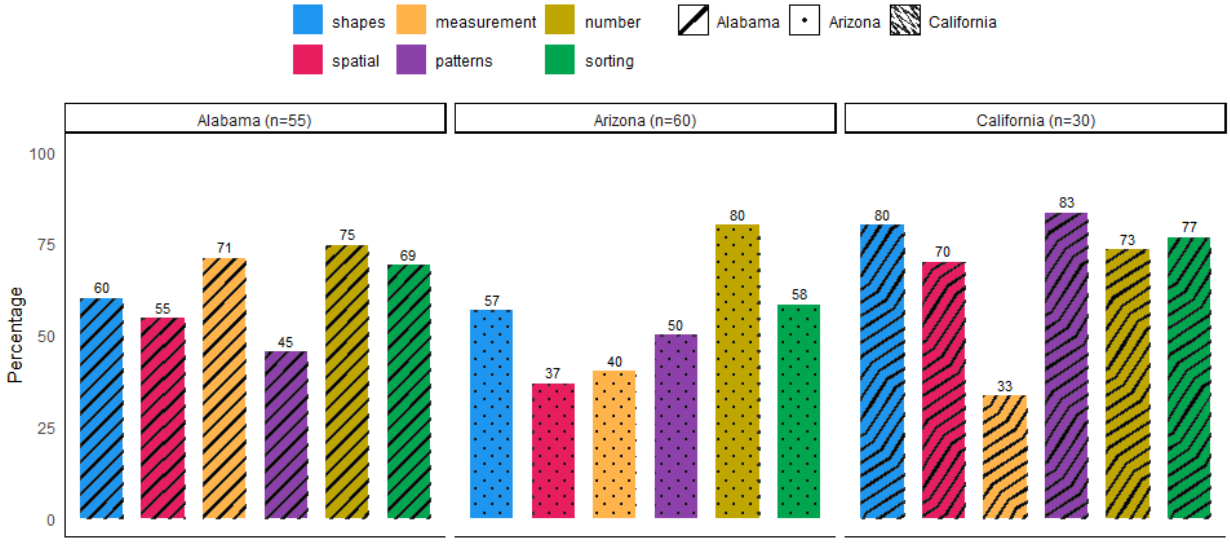
In the post-series survey, we asked all participants about which Family Math workshops they attended (shown in Figure 10). Overall, **most participants reported attending number sense & counting (77%) and sorting & collecting (66%) workshops**.

Figure 10. Topics of workshops attended by participants who took the post survey, all sites (N = 145)



When disaggregating by site (Figure 11), most Alabama participants reported attending number sense & counting (75%) and measurement (71%) workshops, most Arizona participants reported attending number sense & counting (80%) and sorting & collecting (58%) workshops, and most California participants reported attending patterns (83%) and shapes (80%) workshops.

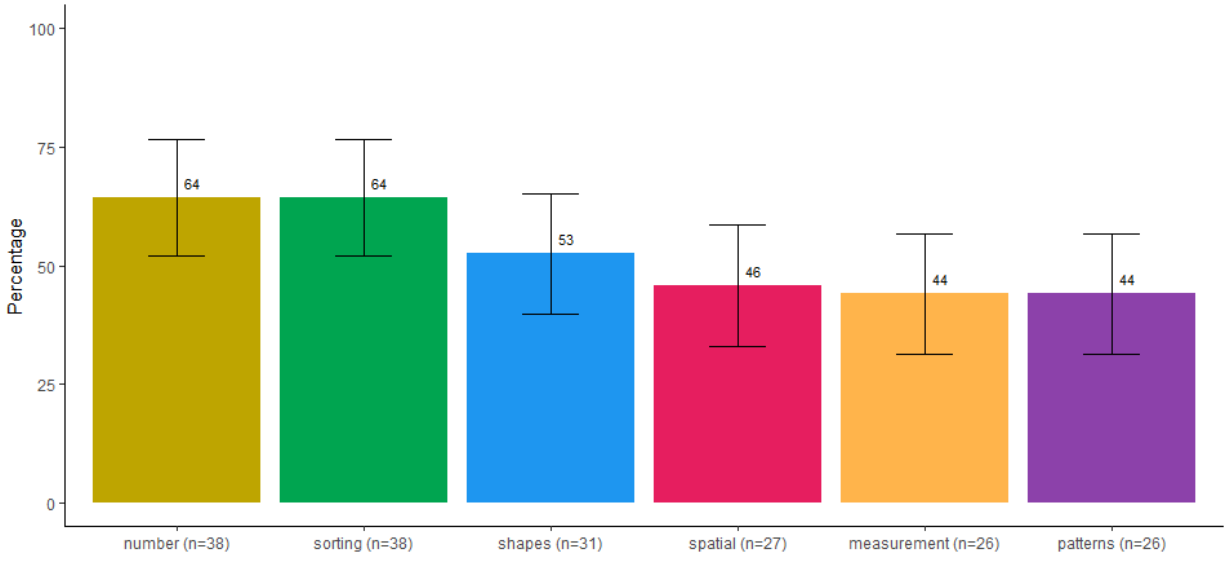
Figure 11. Topics of workshops attended by participants who took the post survey, by site (N = 145)



In the post-series survey, we also asked parents/caregivers in which of the six Family Math topics they have seen growth in their children's skills. In our analyses, we further examined the impact of Family Math by isolating the distribution of responses for each topic to only those who reported attending a workshop that covered that topic (Figure 12). **We found that the top two most attended workshops were also the top two Family Math topics in which parents/caregivers reported seeing growth in their children's skills: number sense & counting (64%) and sorting & collecting (64%).** Relatedly,

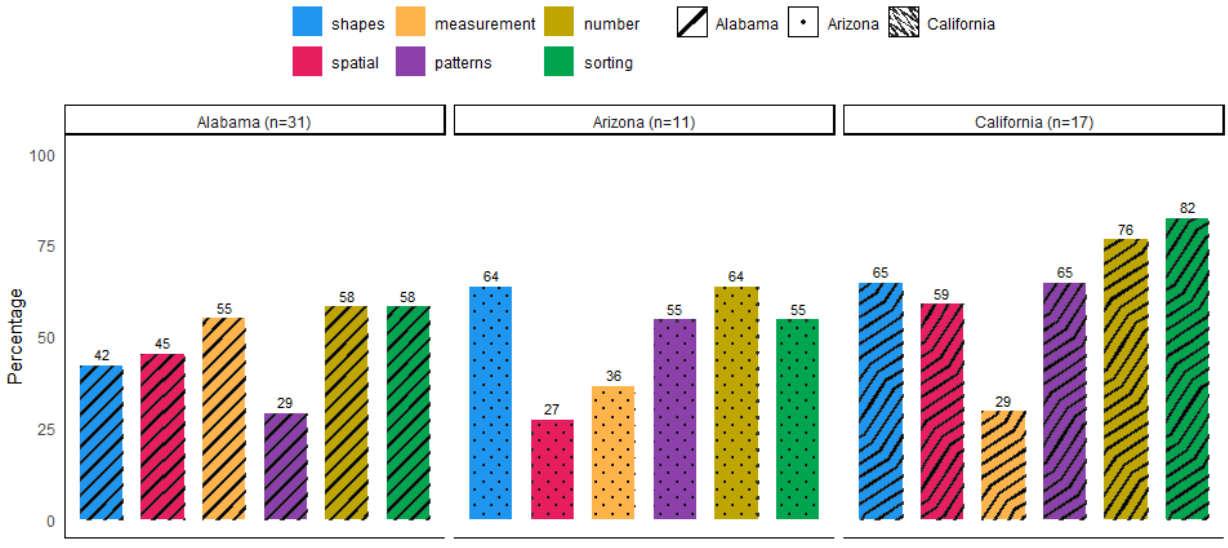
in open-ended responses in the pre- and post-series surveys, number sense & counting was by far the most common topic that both parents/caregivers and educators/providers shared examples of supporting children with, followed by sorting & collecting for parents/caregivers and measurement for educators/providers. In the dscout diary study, number sense & counting was also by far the most common topic in which parents/caregivers reported noticing growth in their children's skills.

Figure 12. Family Math topics in which parents/caregivers who took the post survey and attended the workshop topic of interest also saw growth in their children's skills, all sites (N = 59)



Similarly, at the site level (Figure 13), **the top Family Math topics in which parents/caregivers saw growth in their children's skills often aligned with the topics of the most attended workshops**.

Figure 13. Family Math topics in which parents/caregivers who took the post survey and attended the workshop topic of interest also saw growth in their children's skills, by site (N = 59)



NURTURE A FAMILY MATH CULTURE AT HOME

Support parents' confident modeling and innovating of math learning opportunities and activities.

In the dscout diary study, we asked participants about whether and in what ways **the Family Math workshops made them feel more confident supporting their children's math development**. One California parent/caregiver responded with a resounding yes:

> *"These workshops have made me feel more comfortable about what I can teach and what materials I can share with them … Because, as I said, they are things that we have at home, things that are cheap if I had to buy them, right? And they make me feel more confident because I know that in my environment they can learn mathematics."*

This participant's experience demonstrates how, by not requiring parents/caregivers to go beyond their financial means to engage in math activities with their children, the accessible nature of Family Math can make math learning more doable.

Develop parent and child's identity as mathematical thinkers and doers.

The dscout diary study exemplifies the development of seven families' identities as mathematical thinkers and doers weeks (and in some instances months) after their participation in the Family Math workshops through their engagement with additional Family Math activities. Out of the three activity options provided, **three families chose counting book (librito de números), three chose maracas and shakers (maracas de patrones), and one chose colorful collages (collage de colores)**.

BUILD A SUSTAINABLE FAMILY MATH COMMUNITY

Develop commitment from community partners to host.

All (100%) education leads reported that **it is very likely that their stations will continue to implement Family Math workshops**. This finding speaks to these stations' and their community partners' ongoing commitment to the initiative. An education lead in Alabama describes the factors underlying their station's interest in implementing Family Math throughout the state:

> *"It is a great program. Our state is really focused on early math and literacy right now, so it is timely. The fact that it is put together so well and easy to use makes us want to use it. We are also growing our family engagement in the state, so this is a great tool for doing that."*

All (100%) education leads reported that **it is likely or very likely that their station will collect survey data or other kinds of data in the future for Family Math** or other programming. This suggests that the Family Math Station Grant Initiative helped grow these stations' evaluation capacity.

Connect partners in early learning space.

All (100%) education leads agreed or strongly agreed that **their partners were communicative and actively engaged in the partnership** to implement Family Math. In all, 66.7% of education leads agreed or strongly agreed that **their partners helped them identify language and other accessibility needs** to ensure that the workshop content was accessible to participants and responsive to their contexts.

Foster parent leadership to become facilitators.

Through a local learning collaborative partner, **PBS SoCal connected with six mothers and grandmothers who wanted to become facilitators**. As an education lead in California describes,

> *"We conducted a Family Math training in Spanish at our studio, and those mothers/grandmothers then facilitated the Family Math workshop series for parents and caregivers in Santa Ana in Spanish. This was an amazing way to build the capacity and leadership of our local parents/caregivers. They are incredible ambassadors of the program to other parents."*

A PBS SoCal facilitator who identified as a parent shared their experience as a first-time facilitator and voiced **appreciation for the station making them feel comfortable** with taking on this role:

> *"For me a personal challenge was public speaking, I had never done it before but I really liked the way they supported us to make it possible."*

This is a powerful example of **the potential of Family Math to equip parents/caregivers to be leaders in their communities through opportunities such as the parent/caregiver facilitator program**. The successful training of these Spanish-speaking mothers/grandmothers and their ambassadorship also suggest that parent/caregiver facilitators can help expand Family Math's reach. This example from PBS SoCal not only speaks to this outcome from the Family Math TOI but also results from the ***Sustainability: Advance leadership through parent facilitator program*** target, which in turn results from the ***Empower: Provide leadership opportunities for parents/caregivers*** strategy.

Build awareness of program and content in extended family and community.
All (100%) education leads agreed or strongly agreed that **the Family Math workshops helped them reach participants and/or partners that they otherwise could not have reached**. When we asked about the benefits of implementing Family Math for their station, an education lead in Alabama described how the initiative enabled them to connect with the families in their partners' networks:

> *"It has increased our family engagement and expanded our partnerships. We have worked with the same partners for years, and it can sometimes be hard for them to see us in a different way. Going from someone that only worked with ECE providers to now being able to serve their entire programs is a great thing."*

Opportunities for Further Exploration

There are various components of the Family Math TOI that we did not measure in this study. For example, we were concerned about the sensitive nature of multiple ***moderators*** and the potential low reliability of self-reported information. **Future evaluations of Family Math could assess parents'/caregivers' and educators'/providers' comfort with different kinds of questions** (e.g., related to immigrant status and income) by incorporating opportunities to glean their feedback during the data collection tool development process (e.g., survey testing). Evaluators could then use the questions that are received well, have the highest response rates, and provide the most reliable data.

Self-selection bias is likely present in our sample. At the site level, participating stations were already committed to Family Math. At the participant level, high pre-series ratings in math positivity, math confidence, and knowledge of foundational math skills indicate that participants had time and capacity to engage in children's math learning prior to participating in the workshops. Pre-series levels of math positivity, confidence, and knowledge were particularly high in Alabama. **It would be interesting to see if the positive, significant findings of this study would hold in organizational environments and among communities that are not as well primed for implementation.**

Small sample sizes precluded us from disaggregating site-level findings further by the demographics that we did collect. **Larger samples would provide more opportunities to better understand who the initiative and particular *strategies* within the initiative benefit the most and least.**

The timeframe of the evaluation (less than six months of data collection) was not suitable for assessing the ***outcomes***, which are the more distal changes that we would expect to see as a result from changes in ***targets***. **Lengthening the data collection phase in future evaluations could provide more potential for assessing longer-term changes**, such as Family Math's contributions to children's kindergarten readiness and success. Furthermore, with regard to measuring participants' personal math education histories, **qualitative data collection activities, such as interviews and focus groups, are more suitable than quantitative surveys for seeking to understand how participants' own lived experiences have shaped their engagement in children's math development**.

Another limitation related to the evaluation design is that this study was quasi-experimental; we measured changes within a single group (Family Math participants) over two timepoints (pre and post). Given that we did not also measure changes across time for a control group of comparable parents/caregivers and educators/providers (in terms of race/ethnicity, socioeconomic status, early learning setting, and other characteristics), **we cannot attribute the changes we see solely to the Family Math initiative**. Future evaluations can include other quasi-experimental study designs (e.g., by using a treatment group and a waitlist control group) to further build strong evidence for impact.

Key Takeaways

Through this evaluation of the national expansion of Family Math programming, PBS SoCal wanted to know *"What is it like when it's left our hands, when it's gone into someone else's hands?"* Overall, this study reveals promising evidence about the impact of Family Math. While opportunities exist to continue to increase the robustness of the program's evidence base, we are encouraged by these key takeaways from our mixed-methods evaluation of Family Math in Alabama, Arizona, and California:

- Across the entire sample, **workshop participants reported significant increases in all three core metrics (math confidence, math positivity, and knowledge of children's foundational math skills)**. When disaggregating by participant type, both parents/caregivers and educators/providers reported significant increases in all three core metrics. For individual sites, results were mixed, with the largest increases in core metrics in Arizona. Overall, findings indicate some replicability of the Family Math model in Alabama and Arizona beyond the Greater LA and Southern California communities in which it was co-designed.
- These statistically significant increases in math confidence, math positivity, and knowledge of foundational math skills are particularly noteworthy given that **participants had high pre ratings and were potentially already very engaged in children's math learning**.
- Family Math workshop participants **noticed improvements in their children's math skills, particularly in number sense and counting**, after engaging in a workshop series.
- Facilitators and education leads reported having all the resources they needed to successfully implement the Family Math workshop series. When asked about the biggest benefit of Family Math for them personally, a facilitator in Arizona shared, *"Being able to share the great resources with families and educators. Seeing their excitement and then noticing that math is*

everywhere! This experience was priceless!" Moreover, these partner station stakeholders reported **a strong desire to continue to offer Family Math programming and prioritize early math learning** in their communities moving forward.

- Given that we collected data from educators/providers, station education leads, and workshop facilitators (in addition to data from parents/caregivers), our findings are broader than the scope of the current TOI. **Our findings suggest that various components of the TOI could be applied to these other stakeholders as well.** PBS SoCal can adjust the TOI and Family Math evaluation tools (such as pre- and post-workshop surveys, which are often shared as resources with other stations) to reflect educators'/providers' engagement with the program. These adjustments would align with the interest among PBS stations nationwide to expand the target audiences of Family Math.

The flexible nature of our evaluation approach was not without challenges, such as a lack of control over participants' attendance in all four workshops within a series or the specific topics covered in the workshops. Nevertheless, **this study shows that we can collect meaningful information about an early childhood initiative even if implementation varies from site to site**. The evaluation protocol privileged flexibility to ensure that our findings could speak to how Family Math is actually implemented in the real world. As Dr. Miller recaps, *"We were intentional to not be very prescriptive."* This is a lesson for program evaluators about the power of adaptability in evaluation design, which can enable deeper understanding of how communities tailor programs to meet the unique strengths and needs of their local contexts.

Some replication of positive results following engagement in Family Math workshop series across contexts in Alabama, Arizona, and California provides a rationale to now explore the components of Family Math that have been newly developed, such as new workshops connecting math development to social-emotional learning, and others that are harder to capture, such as engagement with digital content. PBS SoCal's vision for expanding the initiative involves three areas: audience (e.g., building resources specifically for educators/providers), programmatic (e.g., creating curricular intersections with other topics), and distribution of content through new platforms (e.g., developing a mobile app). With these areas of expansion on the horizon locally – and in some cases nationally – there are many future opportunities to continue seeking to understand the experiences of parents/caregivers, educators/providers, workshop facilitators, PBS station education leads, and other stakeholders who engage in Family Math in diverse ways.

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