NextGen Technology:

Insights and Recommendations to Support the Parents of Children Ages 0–3





SUMMARY

Technology is playing an increasingly central role in early childhood education. As the number of apps, social media outlets, and texting platforms increases, however, it can be difficult to evaluate what is working and what isn't. Without this clarity, it's almost impossible to harness technology in a way that meaningfully improves the outcomes for kids.

At the core of its vision, the Early Learning Lab was founded to help build and bring innovative programs and practices to the early childhood field, so we made it a priority to understand how technology is being used to support parents, teachers, and caregivers of children ages 0–5. In 2017, we received funding from the Pritzker Children's Initiative to explore the current state of technology, specifically, technology to support the parents of children 0–3, and to articulate improvements that could increase its future effectiveness.

We created specific parameters for our research:

- Focus on parent-facing technology rather than technology meant to be used by or with children;
- Expand beyond the provision of information about child development and developmentally appropriate activi-

ties, so as to include technology that helps with a wider range of parents' needs, according to the Protective Factors framework; and

 Explore how we can improve the whole ecosystem of technological support for parents, rather than recommending investment in specific products or types of products.

The process involved several methods of primary and secondary research. We created an inventory of technology products and platforms used by parents; interviewed parents about how they use technology; conducted two nationwide surveys; and combed through the relevant existing research.

After distilling the information we gathered from these sources, we established insights and recommendations for the future that are contained in this report, "NextGen Technology," so named because our purpose is that this resource will bring us to the next step in understanding and action.

We welcome your thoughts and other opportunities for dialogue.

OVERVIEW

Since the Early Learning Lab's inception in 2015, program providers and funders have asked about the role of technology in our collective work: How can technology be used to better support the parents, caregivers, and teachers of young children? How do we evaluate the effectiveness of technology? How can we make decisions about which technologies to use?

In 2017, the Lab received funding to answer these questions, specifically to focus on supporting the parents of children of 0-3 years old. Within these parameters, we sought to answer two questions:

- How is technology currently being used to support parents of children 0–3?
- What improvements can be made to increase the effectiveness of technology in supporting this population?

Why technology?

Before we dive into the "how" of our study, we should take a moment to talk about the "why." Why is there so much interest in the use of technology to support the parents of young children?

The promise of technology is that it can meet the needs of large numbers of people efficiently for the following reasons:

- Technology, specifically mobile technology, is ubiquitous. Never before have so many people had 24/7 access to information and the tools that mobile technologies can provide. Because so many people can be reached via mobile technology, it has the potential to provide support to parents in a scalable manner, reaching far more people than in-person services at a lower cost.
- Technology offers the ability to provide on-demand resources, when a parent needs support the most.
 Parents can look up specific information they need in the moment ("What is the best way to swaddle a baby?") instead of having to rely on someone sending them or telling them the information. Likewise, parents can get a ride to their child care center when their car breaks down using a tech service like Lyft or Uber.
- Technology, using data analytics and/or machine learning, can personalize information and resources

for parents' specific needs in a way that is much more efficient and useful than one-size-fits-all content or services.

There are situations in which technology is not the best way to support a particular individual or a particular group of parents, especially those with deep needs such as families experiencing trauma or violence. In those cases, there is no replacement for hands-on support from trusted and caring people. However, even those services can benefit from the integration of technology into their programming to extend their services between site visits or sessions.

Methodology

Our process for answering these questions has been threefold, involving:

- 1. Creating an inventory of technology products and platforms used by parents.
- 2. Conducting long-form dialogue interviews with a sample of parents, to better understand their views on parenting, their aspirations, and how they use technology on a daily basis. (Eight low- and middle-income parents from the Bay Area were interviewed.)
- Conducting two national surveys of 500 parents of children 0–3 (a representational panel, with data disaggregated by income). These surveys, called "Early Learning Lab — NextGen Technology National Parent Surveys," were conducted in 2017. Full survey data is available as an appendix to this report.

In addition to these data sources, we incorporated findings and attempted to build on a number of recent reports looking at parents, parenting, early childhood, and technology, including the 2016 "National Parent Survey" from Zero to Three, "Reimaging School Readiness" from the Center for Childhood Creativity, and the "Parenting Matters" report from the National Academies of Sciences, Engineering, and Medicine.

Our study differs from other early childhood technology scans that have recently been published or are soon to be published.¹ It is not a review of child-facing technology (educational games, apps, etc.). The products and platforms we investigated are meant to be used by parents, not by children, and, for the most part, are not intended for co-viewing with children. Finally, while our intention is to discover how technology is being used (and more importantly, determine what is working and why), it was never our goal to "pick winners" out of the technologies we scanned. We were not looking for a "silver bullet" product to improve outcomes for all families across the country, which is why our recommended steps for action cover improving the technology ecosystem rather than calls to invest in specific technology products. We hope that the information contained in this report will spark ideas for investors and funders who are looking to use technology to support parents; developers of technology products who are looking to create impactful new tools to support parents; and early childhood leaders and program operators who are looking for ways to incorporate technology into the services they offer for the parents and families of young children.



INFORMATION GATHERED

Map of Technology Products



Over the past two years, we have heard much interest in the use of technology to support parents from leaders in the early childhood field, but also some concern that it is difficult to wrap their collective heads around the number of new technology products and platforms popping up. Furthermore, there did not seem to be an easy way to assess which technologies have an evidence base for impact.

We created our online interactive map of technology products in response to these concerns and requests. Initially, we focused on products that are developed and marketed for the parents of infants and toddlers. Typically, these fall into two categories: 1) tools to communicate information about child development and high-value practices and activities parents should do with their kids, and 2) trackers that allow parents to collect data on feeding, diaper changes, vital stats, etc. But when we thought about the range of supports that parents of young children need, we did not think that these two categories told the whole story. So, we decided to think more expansively about the needs of parents and the ways technology is helping to meet those needs. Specifically, using the Protective Factors framework as a guide, we sought to understand how technology is being used to support the following in parents of children 0-3:

- Parental resilience
- Social connections
- Knowledge of parenting and child development
- Ability to access concrete support in times of need
- Ability to support the social and emotional competence
 of children

As might be expected, thinking about technology using this lens greatly widened the scope of products in our inventory, incorporating social networking platforms such as Facebook, which is used to develop and maintain social connections, and meditation apps such as Headspace, which can help parents manage their stress levels, in addition to products that provide information about child development. We believe that this expansion paints a truer picture of how modern parents are using technology to strengthen their families and support their children. This is the picture that the early childhood field needs to consider as we collectively work to better support parents.

Our interactive map of the technology products and platforms that are being used by parents of children 0–3 can be found <u>here</u>. When you click on this link, you will see the map with instructions on how to access the different

views and filter the information in the left sidebar.

The default view is to see the products grouped by protective factor, but you can also view the products grouped by distribution channel to parents and funding source. In each view, you can filter the map based on:

- Type of product (access to information, resource navigator, etc.)
- Whether the product is research-based
- Whether the developers have published evidence on the impact of the product²
- Protective factor
- Distribution channel
- Funding source
- Estimate of number of users

Please note, the estimates were largely based on number of downloads in the Google Play Store, as number of users is often not publicly available information. In some cases, developers responded to our inquiries about number of users, and we used the information they provided. However, most developers declined to state the number of users. Because of the wide range of user numbers for the products, we grouped them into five categories, from "very small" to "very large."

The map of technologies reveals a few interesting insights:

Little evidence of impact: The number of technologies that have published research on evidence of impact is very low. Out of the 96 technology products we included, only 12 have an evidence base. Of those, eight were focused on health- or mental health-related outcomes and four had evidence of impact around early literacy, oral language development, or parental knowledge of child development. There could be a number of reasons for the lack of evidence base for most of the products. For one, we looked only for published studies. If a developer conducted an evaluation of the product but did not publish the results on its websites, we would not have included it in the map. We are aware of a few evaluations that are in progress, but they were not included. Another reason for lack of evidence of impact could be that the product simply has not been evaluated. This is generally the case for commercial products (which have the most reach and potential for impact), as there may be little incentive for a developer to conduct an expensive evaluation. Finally, there are some products that are in



the early stages of development and may not be ready for a full evaluation such as a randomized controlled trial (RCT).

A few platforms capture most of the market: In terms of number of users, it is clear that there are a handful of platforms that fall into the "very large" or "giant" category, with 100 million to 5 billion users, including products such as Facebook, Instagram, and Spotify. A second tier of "large" products reaches millions as well, which includes commercial sites such as Babycenter. com but also some philanthropically supported sites such as GreatSchools (with 50 million users) and Zero to Three (with 2.75 million users). There are many more products that fall into the "small" or "very small" categories, reaching up to 50,000 or 5,000 users respectively. When thinking about technology and the potential for scale, we should acknowledge that while technology use is ubiquitous by today's parents, there may just be a handful of platforms that have the reach to help support parents at scale.

Parent Profiles

In the spring of 2017, we conducted a series of open-ended, two-hour long interviews with parents of children 0–3 from the Bay Area. Parents were recruited primarily through partner community-based organizations, such as a family resource center, a local Head Start, and a prenatal program for homeless women. As the participants' schedules allowed, we attempted to conduct the interviews in their homes. Although our sample size of eight was not large enough to draw conclusions about attitudes toward parenting or the use of technology, the interviews helped us better understand the experience of being a modern parent of a young child in challenging circumstances, and they contributed to the insights we generated through this work.

The following are profiles of two of the parents we interviewed. While their stories are real, we have changed their names and used stock photography to protect their privacy.

Jay Cee



Student

Single mom

Part-time lactation peer counselor

Forging her own path

Bio

- Jay Cee is the mother of a 2.5-year-old boy.
- She grew up in Oakland.
- Her mother moved to San Diego when she was 13, and she was primarily raised by her grandmother, then her father, then her sisters.
- She dropped out of school before ninth grade.
- She jumped from job to job and had two miscarriages, before deciding to seek out a career and go to school to study psychology.
- She was helped by a WIC lactation consultant after the birth of her son, and found it so valuable she decided to train to become a peer counselor herself.
- She does not have a relationship with her son's father.
- She hopes to be a family therapist one day.

Challenges

- **Housing:** She was couch-surfing with her son before landing in temporary public housing.
- Child care: She has a nanny but would like to find a preschool.

Services used

- Youth Uprising Parent Café
- WIC lactation counseling
- Nanny
- Head Start (applicant)
- Castlemont Preschool (applicant)

Motivators

- Her son
- Close friends and family
- Meditation
- Spirituality
- Church (before she lost faith)

"You just have little moments at this age; you'd be surprised how much they—little sponges absorb so many different things."

Favorite tech



"I just feel like because of my struggles, they [my family] don't really understand me, just because family can be our worst enemy sometimes. I think my approach is to do everything opposite of what she [my mother] did."

The names of our parent interviewees have been changed to protect their anonymity. Photos used are stock photos.

Annalisa



Stay-at-home mom

Former student

Self-sacrificing

Bio

- Annalisa is the mother of two girls, ages 5 and 2.
- She was studying to be a translator when she had her first child, but failed to pass the oral exam and lost her passion for the work. She decided to stay at home to focus on raising her children.
- She lives with the children's father.
- She found her first child easy to parent. Things became much more difficult with her second, thanks to a difficult pregnancy, the different temperament of her younger daughter, her difficulty breastfeeding, food allergies, a lack of routine, and a lack of sleep. She found the Room to Bloom playgroup when her younger child was 10 months old, and she found it incredibly helpful in establishing routines and in connecting with other families and the staff. She has not been able to attend recently, because of transportation and other logistical issues.

Challenges

- **Transportation:** She does not have access to a vehicle, so she is limited to taking the kids out in their stroller.
- **Time to herself:** As a stay-at-home mother with two children, she rarely has time to relax or get a break from caring for her children.
- Education: She would like to return to school to become a teacher, but finding the money for school is difficult.

Services used

- Room to Bloom playgroup
- Help Me Grow
- Local preschool

• WIC

Motivators

• A motivator and stressor — doing it all, all on your own

"I would always research stuff. How to keep them healthy, happy. How to maximize their learning experience. I would always read to her. It would just be me and her all day long...I didn't feel the need to take her out to different places like a museum or any kind of attraction like that."

"The other day, I went for a haircut. ... It was 30 minutes, and I was like, 'Wow, I feel amazing! I need to do this all the time.' Just something for me. In the day, I would be a lot more patient. When I start to get really tired, my patience gets thinner. I take a deep breath, I do what I need to, I pray."

Favorite tech



INSIGHTS

What are we learning about parents' needs, motivators, barriers, and use of technology?

Based on the information we gathered from the technology scan, the interviews, and the National Survey of Parents, we came to the following insights:

- 1. Google is king: When asked where they turn when they have a question about their child's development, most people said they ask a friend or family member first. If they still need information, they mainly use Google to look for the answer to their question. All of our interviewees described an intuitive process of vetting the search responses to find information they felt was trustworthy and most relevant to their needs.
- 2. A bias toward peer-to-peer learning: Our interviewees demonstrated a preference for learning from other parents rather than from parenting experts. This did not seem to indicate a lack of respect for expertise or authority (most, for example, did say they trust their children's pediatricians and ask them health-related questions). Rather, our interviewees expressed the opinion that they felt that the experience of other parents was more "real." Most of the parents we spoke to had specific parents in mind whose parenting style they respected and whom they would turn to for advice. If they still needed guidance, many watched YouTube how-to videos from other parents discussing such subjects as how to swaddle a baby, bedtime routines, or how to potty-train a child. In reading parenting articles online, a few parents we spoke to said they often skip to the user comments at the end to see how other parents responded.
- **3.** Mobile first: 79% of parents surveyed had used a smartphone in the previous week, as compared to 69% who had used only a computer. This is reinforced by 2017 Pew Research Center data that shows 95% of adults in the United States have a mobile phone, and 77% own a smartphone. There is consistent data on low-income adults indicating that 92% of adults earning less than \$30,000 have a mobile device, 64% of which are smartphones.³ The headline here is that many parents who use technology and access the Internet do so on mobile.
- **4.** Parents are forging their own path: A common theme that emerged from our interviews is that parents are actively seeking to forge their own path when it comes to parenting their child. Often, this leads to conflict with family members (their own parents, in-laws, and partners) who have different ideas and parenting values. This was also one of the findings of Zero to Three's

2016 National Parent Survey. The parents we spoke with were in information-seeking mode. They described turning to many different sources for guidance (friends, parenting blogs, books, websites) and spoke about the need to parse through often conflicting advice to figure out what is right for them and their child.

- **5.** Parents want their kids to be happy, kind, and live meaningful lives: In our interviews, when asked about their aspirations for their kids, most parents first said they wanted their children to be happy and successful. Education and academic accomplishment were further down the list. This was reiterated in our survey. When the parents surveyed were asked what they want most for their child in life, "academic achievement" came in last at 2.5%. This is relevant for the way technology products and other supports are positioned to parents. As referenced in Insight #4 above, parents are in information-seeking mode, but they might be more motived by messages about the social-emotional development of their children than brain-building or early literacy.
- 6. Parent support services are helpful: Most of the parents we interviewed spoke approvingly about local resources for parents, including playgroups, parenting classes from family resource centers, and events like storytime at local libraries. They also described an array of services they had accessed, such as Help Me Grow, a developmental screening program operated by Alameda County and WIC. Our sample may be biased in favor of services, because the interview subjects were largely recruited from Early Learning Lab partner organizations, many of whom operate services for parents. Indeed, this finding contradicts other research, such as the recent "Parenting Matters" report and the Rainin Foundation and University of Chicago NORC survey of parents in Oakland, which found that 73% of parents in many neighborhoods of the city are not aware of neighborhood organizations they could turn to when they need help. Nevertheless, the parents who did discuss the services all spoke highly of the programs, even if they were able to attend for only a limited time due to logistical difficulties.

RECOMMENDED ACTION STEPS



We don't believe that lack of knowledge is the only barrier to effective parenting, but being able to find high-quality information when you need it most is a common need for all parents. As mentioned in the Insights section, when looking for information about parenting or child development, most of the parents interviewed and surveyed said they turn to Google or another Internet search engine if they are not able to find the answer from a friend or family member. Specifically in the case of the survey respondents, 40% of parents said they use Google. Parenting websites such as Babycenter.com came in a close second, at 35%. Twelve percent of parents turn to parenting apps, and only 4% use parenting texting programs, despite the fact that texting is the second most frequent way respondents use their phones (at 64%, just slightly lower than the most frequent activity under the category "using the Internet").

Based on these findings, we conclude that the best way to provide information to parents is to put the information online, instead of locking content in programs or apps that parents have to download or register for, and to use search engine optimization (SEO) to ensure that parents can find the high-quality, evidence-based content we would like them to access. Online advertising and keyword advertising in particular, such as Google AdWords, is another strategy the field can use to boost high-quality content that is already being created.

As search engines evolve and people move from screen to voice-assistance services, an increasing number of people will be accessing information through platforms such as Amazon's Alexa, Apple's Siri, Google Assistant, and Microsoft's Cortana. The content that these services pull from is often dependent on the content partnerships that companies have in place. For example, if you asked each of the platforms to play "Girl Like You" by Toro y Moi, you might have varying success, because each service partners with a different music streaming service. Siri pulls only from Apple Music, Google favors Google Play Music or YouTube, Cortana pulls from Microsoft's Groove Music Service, and Alexa favors Amazon's Music Unlimited service but will also pull from Spotify. If you want to make dinner reservations, your best bet is to ask Siri, because of Apple's integration with Open Table. We have an opportunity to get ahead of the game by working with the companies behind these voice-assistance services to develop content partnerships that provide on-demand access to high-quality, personalized information for parents based on the needs of their specific family.

Another relevant finding from our interviews is that parents are looking for peer-to-peer content. Platforms such as YouTube allow parents to create and post their own videos about their parenting strategies and tactics. This type of content appears to be more relatable for parents than expert advice (and frankly, more entertaining). A quick search on YouTube on most parenting topics will reveal a community of vloggers — such as How to Be a Dad and Emily Norris — that have millions of views. It is worth considering the ways in which such talent could be leveraged for the early childhood field.





Once again, while access to information is necessary, we believe that there are a number of barriers to effective parenting beyond lack of information, which is why we adopted the Protective Factors framework for this study. If we think about the range of needs parents have (forming strong social network, accessing resources in times of need, maintaining their own resilience, and managing stress levels), we can see that technology is often already being used to meet those needs. You can see this in the use of products like WhatsApp and Facebook for maintaining social connections, and evidence-based apps like Lantern, which provides on-demand cognitive behavior therapy. Furthermore, there is opportunity ahead to build more technologies to meet parents' most pressing needs at scale.

The key when building new technology tools, particularly when thinking about technology as a means to scale, is to build tools that people will want to use. This may seem obvious, but it is often overlooked when technology is thought of as an intervention for behavior change. When technologies are incorporated into programs — for example, a texting program that is offered to everyone who has a child at a particular Head Start center — there may be some social incentives to use the product. However, when trying to reach the vast majority of parents of infants and toddlers who are not in child care, it is harder to incentivize people to adopt a technology unless that technology is either useful or pleasurable.

We believe that when creating new technologies, developers should ensure they are designing for "spreadability." How can we create a product that people will use and others will be incentivized to adopt as well? How can we design a product that everyone will want? That goes "viral"?

Often, people working in the social sector create tools and services that we think people need. But we forget to think about what they want. We can look to the design world for tips on how to do both. The graphic above references design tips from the sociologist Everett Rogers's 1962 work *Diffusion of Innovations*. We add these additional design tips for creating technologies to support parents, specifically:

- Ensure tools meet users' short-term and long-term needs. Often, in the early childhood field, the payoff for the work we do in early development is not apparent until later in the child's life. Early language acquisition in the infant/toddler stage will help a child be kindergarten-ready and reading at grade level in elementary school, but that won't happen for a number of years. In the meantime, a busy parent, like most of us, has more short-term needs that demand attention. How can we design tools that meet these longer-term needs and also help parents in the near term? Giving parents access to data is a good way to help them immediately see the effect of their interactions with their children. LENA and the Starling are two examples of tools that put data in the hands of users.
- Consider the needs of multiple stakeholders. Even if the parent is the primary beneficiary of a particular tool or service, there are likely other stakeholders who might also benefit from the technology, and those other

stakeholders might provide the social incentive for the parent to use the tool. For example, a technology that helps child care providers communicate with parents benefits both parent and caregiver.

 Think about messaging and marketing of technology products. Developers should keep in mind the motivations of parents who are potential users of the tools they create. What do parents want for their children? What will motivate them to use a particular product? The answers will vary, of course, but based on our survey and interviews, it seems that parents are very focused on their child's social-emotional development. However, looking at the products in our technology map, we find very few tools aimed at the social-emotional development of the child and many more targeted at cognitive development and health, even though in the infant/toddler phase, cognitive and social-emotional development are fairly enmeshed.

Three technologies we feature below are tools that take a creative and constructive approach to improving the lives of parents and other stakeholders. FINDconnect, a tool being developed by the UCSF Child Health Equity Institute (CHEI), not only helps parents access resources but strengthens the often scattered networks of providers in a community; provides data for rigorous research studies; and most importantly, builds better relationships between parents and providers. BabyNoggin helps parents track their child's developmental progress; educates them on child development; facilitates information-sharing between parents and pediatricians; and allows participating physicians to receive insurance reimbursement for the developmental screens that parents can access through the app. Peanut uses dating technology to help mothers "swipe right" to overcome social isolation and connect with other mothers in their community.

On a final note, we know the focus of many organizations in our field is to help low-income parents in particular. That is why we feel it is important to advocate for the needs of low-income users with technology companies. Silicon Valley does not often design for this demographic. However, we caution against the inclination to build technology products for low-income users only. Our interviews revealed that both low-income and middle-income parents identify with many of the same brands, such as Facebook, Disney, Lego, Starbucks, Nike, and Target. If we want to reach a large number of low-income parents, we may find it most effective to be aspirational and appeal to as many people as possible.



BabyNoggin: Child Development Screenings in the Palm of Your Hand

When she was pregnant, Dr. Jin Lee was surprised by the lack of available resources on child development. The Oxford-trained child psychologist wanted to change that. That's why she developed BabyNoggin, a mobile app that helps parents track how their children develop and then conveys that information to health care professionals and insurance companies.

As a child psychologist, Dr. Lee knows the importance of child developmental screening, which delivers trustworthy information on a child's developmental milestones and helps identify children who could benefit from interventions. These screenings are time consuming, taking an average of eight minutes at the pediatrician's office.

With BabyNoggin, a parent can download the app and complete the test at home. The test employs a commonly used measure called PEDS:DM, which is written at a second- to fourth-grade level and has only six questions. The easy-to-use home screening saves the pediatrician almost a third of the average 20-minute doctor's appointment, freeing up precious time during a well visit. And after the screening is completed, BabyNoggin facilitates reimbursement to the doctor from the patient's insurance.

"As a busy mom of two, I have a very difficult time keeping track of my own health records — let alone my child's," said one BabyNoggin user. "A child grows up so quickly that I found BabyNoggin helpful to be conscious of what's important and what to focus on next." In addition to developmental screening, BabyNoggin educates parents about child development and suggests interactive, developmentally appropriate activities for families. For those who need more resources, users have access to a referral system to find local nonprofits and state entities based on the results of their screenings.

With a focus on combining the health, education, and digital communities with parents, caretakers, educators, and insurance companies, BabyNoggin builds relationships between all of these constituents in an innovative way, and the possibilities seem endless. Looking forward, Dr. Lee foresees more community-building and a wider reach, envisioning partnerships with nonprofits and government agencies to boost early intervention in lower income areas. Ultimately, she is working toward the goal of getting every child screened — a major step that could dramatically improve health and education outcomes for families and communities everywhere.



The Birth of Peanut: Delivering a Mobile App for New Mothers



When Michelle Kennedy was pregnant, she started to look for support from other pregnant women, whether she wanted mothering tips or just companions for coffee. At the time, online communities existed through Web-based forums and Facebook, but the interfaces were out of date, and their presentation didn't appeal to the modern woman. Kennedy identified the need for a mobile application that could connect her easily to other current and expecting mothers. A short time later, Peanut was born.

Peanut was launched in 2017, informed by Kennedy's experience developing a well-known dating application, Bumble. As with Bumble, users swipe right to find like-minded mothers to connect with and build community. Group-chat capabilities encourage relationships between women so they can support each other through the joys and the hardships of motherhood, while also providing them the resources to meet offline.

Kennedy emphasizes that the need for social connectivity, especially when new moms are feeling isolated and lonely, something that mothers often experience when they find themselves confined to the home with their children. To appeal to all kinds of women, the app is free, accessible, and easy to use. Initially, Peanut was developed only for iOS, with the understanding that this would be the primary platform, but the developers immediately began receiving requests for a platform compatible with Android. With over 70% of email feedback asking for an Android version, the company realized that Peanut needed to be functional on all types of devices to reach all mothers.

Peanut aims to appeal to different types of users by allowing customized profile options. These start with the user's basic details, such as "pregnant" or "mother," and the number and age of her children. Peanut has added additional preferences, such as special needs mothers or children, and LGBTQ mothers or children. The intention is for mothers to build relationships with others who have had similar experiences and can provide mutual support.

Peanut has begun targeted outreach to low-income mothers, for whom a community of like-minded peers can provide a great source of assistance. In reflecting on how Peanut could reach lower-income mothers, Kennedy formed partnerships with nonprofit and charity organizations that serve lower-income parents in both the United Kingdom and the United States. Kennedy invites these organizations to encourage their beneficiaries to download the app and connect with other low-income moms. Through a partnership with Gingerbread, a U.K. charity for single parents, Kennedy learned how single moms in particular have a special affinity with other mothers who are raising their children on their own. To address this need, Peanut added an option for "single mom" in the user's profile.

Michelle Kennedy found it frustrating at times to pitch her app and receive questions like "Do mothers really need this community?" and "Why is this only for mothers and not for fathers, too?" Despite these critiques, she's worked hard to develop an app that reaches all mothers, regardless of income, ethnicity, or geography. Peanut has already had a significant level of success, with over 10,000 downloads, and the app is poised for further growth as it acquires and maintains a broad and diverse user base.

FINDing the Right Resources for Low-Income Parents and Caregivers



The Oakland-based pediatrician Dr. Dayna Long was dissatisfied with her ability to practice medicine in her community,

finding that the skills she learned in training were not adequate to make her patients as healthy as they could be. She wanted to build a tool that allowed her to truly address her passion for achieving health equity and improving outcomes for all children and families. In 2012, she developed the Family Information and Navigation Desk (FIND) program for USCF Benioff Children's Hospital Oakland and its technology-based platform, FINDconnect. FINDconnect connects families of young children to needed resources in their communities, in an effort to address the social determinants of health. Just as importantly, it helps to establish relationships and build trust between a variety of stakeholders in the community.

FINDconnect started small and low-tech — a volunteer sat in front of the hospital with a sign, distributing information about free or low-cost summer activities — and families responded by talking with the volunteer and following up for more resources. Dr. Long collected evidence to prove in a statistically significant way that providing customized, culturally responsive resources helped to resolve unmet social needs. With the help of the software development company Digable, FINDconnect is now a cloud-based platform that features thousands of resources from a wide variety of community-based organizations serving families.

But for Dr. Long and Artanesha Jackson, a clinical social worker and program coordinator for the FIND program, FINDConnect is not just about providing access to resources. Their vision is much broader and more substantial. They see the technology as an enabler for difficult conversations around poverty, violence, mental health, and other social and environmental determinants of health. There are three FIND Navigators who work at the FIND desk to recruit families; register them on the platform; conduct needs assessments; create action plans; and ultimately provide referrals to resources. The Navigators are multilingual community members who have experienced many of the issues that the families they serve do, which helps to build a sense of trust and understanding.

The vision for FINDconnect is to expand it dramatically, eventually reaching all low-income families nationally. To accelerate its growth, the FIND team is working to build the evidence base for the tool through a series of academic trials that will provide the statistically significant data required by policymakers, funders, and venture capitalists who are interested in the platform.

While community engagement and case management are traditional outreach services, FINDconnect allows for a more streamlined and efficient process through its data- and cloud-based platform. Just as the FIND team is focused on the work of strengthening relationships between families, clinicians, and the community-based organizations that make up the social safety net, its innovative technology tool works by serving the needs of and connecting these multiple stakeholders.

> ADDRESSING THE SOCIAL AND ENVIRONMENTAL FACTORS THAT IMPACT HEALTH

3	Help service providers incorporate technology into their programming.
WHY	Parents spoke highly of services provided, but most could only attend for a short period of time for logistical reasons. And research also shows that a majority of low-income families are not accessing services. There's an opportunity to extend and deepen the services and social support by connecting people via technology when they are not able to physically attend a program.
HOW	 Before thinking of build vs. buy, service providers should explore free tools & platforms that parents are already on. Consider the range of supports parents need and be creative about how technology can extend the services provided. Technology could provide a lower-cost, lower-touch version of services for providers that are trying to reach more families.

Our interviews revealed that the parents who were accessing parenting services in their community were genuinely appreciative of them. This might be explained by the fact that we recruited our interviewees, in part, from some of these service providers. Previous research, such as the "Parenting Matters" report, has found that most parents are not being served by community-based organizations. At the Early Learning Lab, we have heard from our conversations with service providers that there are two reasons why many parents are not being reached: 1. Parents are not aware of the services that are being offered (in other words, marketing of the services has not been effective); and 2. Parents are aware of the services but are being turned away because the organization does not have the resources to accommodate them.

If the latter is true, service providers have an opportunity to use technology to extend their services, perhaps using a lighter-touch option, to larger numbers of families. Of the parents we spoke to, those who were able to attend on-site services such as playgroups or parenting classes only did so for a limited time. Once they were unable to attend the programming, they no longer had a connection to the provider or the other attendees. Technologies like Skype are being used by home-visiting programs to connect with families. Ride-sharing services could be developed for people who do not have access to reliable transportation. WhatsApp groups or Facebook groups could keep the conversation going once families have left the building. Organizations should take into account how their families already interact with technology as they plan strategies for using technology to extend their services. Pursuant to our earlier point about making benefits clear, people are unlikely to adopt a new tool unless it provides a compelling benefit to them: What technologies do their families have access to? Do they have reliable Internet connectivity? What do they feel comfortable using? Are there language or literacy factors that should be taken into consideration? What kind of technical support and training can be provided?

Just as incorporating technology into services can benefit community-based organizations, partnering with community-based organizations, child care centers, and schools can help technology developers increase adoption and scale for their products. For example, the texting program Ready4K partners with school districts to give parents the option to use their program when they register their child for school. This helps ensure a healthy uptake of the texting program. Similarly, Ready Rosie is partnering with Head Start and Early Head Start programs to offer its tool as a solution to the Head Start Parenting Curriculum requirements. Partnerships with corporations and media companies, such as Vroom's partnerships with national brands P&G and Goya, are another way to reach more parents and increase adoption of a product.

Conduct further research with parents.

WHY	The study we conducted is only the tip of the iceberg. In order to gain a fuller picture of modern parenting in America, we recommend further research. How do the needs of parents change across the years? We looked at the parents of children 0–3, but it is likely that parents will need different supports when their children are 3–5 and 5–8. Different sub-populations of parents will have specific needs. The more granular we can get, the better we will be able to design new tools, programs, and services for parents.
HOW	 The long-form, open-ended interviews yielded rich data. Deep research in different communities is needed to get a full picture of modern parenting. Recruitment is key — our informants may have been biased toward services since they came from our partner organizations. Much can be gained from study of "positive deviants." Why do some kids from low-income backgrounds thrive academically? What are the practices and mindsets of their parents?

Our research project was relatively modest, and it was intended to be applied research to gain insights rather than academic research. In order to get a clearer picture of parenting and technology, more research needs to be done. Thankfully, we know of a number of surveys on parents and technology that will be released soon, but we found the open-ended dialogue interviews to be a rich source of nuanced information. We would urge other organizations to use that technique in addition to or instead of surveys. Responses are likely to vary across geographic areas and with different types of parents. Furthermore, we expect that use of technology and priorities will shift for parents as their children grow older, from 0–3 to 3–5 and 5–8. However, because the technological landscape changes so quickly, we also think it is important to stay nimble and keep in mind that things will look very different five years from now.



CONCLUSION

As we've detailed in this report, "NextGen Technology," the Early Learning Lab's research shows a snapshot of the current landscape and future possibilities in using technology to support children ages 0–3. These insights can build on the previous work done on early childhood technology and parent engagement and help to shape the way we support parents moving forward.

So with the information gathered through that work — a technology scan, parent interviews, and our two proprietary surveys we call the NextGen Technology National Parent Surveys — we crystallized our recommendations into these conclusions:

For those looking to use technology to improve outcomes for children and their families, we believe you are on the right path. But we offer the following takeaway: rather than looking for the "silver bullet," or single solution that will meet the needs of families at scale, think expansively and creatively about how technology can be used. We leave you with these few final thoughts.

There are very few technology products with an evidence base for impact on specific child outcomes or parent behavior change. There are various reasons for this. One is that evaluation is expensive and time consuming, and many products (especially new technologies) may not be ready for such an investment. Additionally, there are few incentives for commercial technology developers to conduct RCTs and other forms of evaluation. *We would encourage funders who are interested in scaling evidencebased technologies to consider funding evaluation of promising products so the field as a whole can gain a better understanding of which products work for which families, under which circumstances.*

But even so, the evidence-based tools and programs that are out there are insufficient for achieving the outcomes that we as a field hope to achieve, namely kindergartenreadiness for all children. We need new solutions, and if funders are only looking to scale evidence-based products and programs, we will never create anything new.

Our product inventory revealed that there are a number of gaps in the early childhood parent support marketplace. For example, there are not very many products that are focused on supporting the social-emotional development of very young children. Gaps are opportunities. For funders who are focused on specific outcomes that are not currently being addressed by technology products, we encourage you to be generative and provide startup funding for new ideas. One way to accomplish this is to partner with social-impact technology incubators and accelerators, such as the New Schools Venture Fund Ignite program or the Unreasonable Institute. Both have been looking to seed new products that can fill early childhoodrelated market gaps.

We should be smart about how we develop and deploy new tools: identifying the outcomes we seek and the measures we will use to know if we are on target; and taking a rapid-cycle approach to evaluation that can guide us as we implement and improve new tools, programs, and services. We may also need to think about technology as part of a range of solutions or interventions that can support families, rather than as a stand-alone solution. Any one product evaluated in isolation may not have the impact that we seek, but when technology is used to bolster other services and programs it can be the catalyst that makes a difference for some people. We may need to take a more holistic approach to supporting families and reorient our thinking around technology as separate from other services.

Our observation at the Early Learning Lab has been that many community-based service providers are not actively using technology to deepen or extend their programming. We encourage funders that are interested in supporting service providers, including those offering evidence-based interventions, to offer to fund technology capacity-building and planning for those organizations. This can take the form of technology audits so the organizations can better understand their existing technology assets, identify the unmet needs of the families they are serving, and build the technology-enhanced programs and services that can better support modern families.

Our technology product inventory demonstrates that there are a handful of products and platforms that are used by large numbers of people and many, many products that serve small numbers. The one platform that everyone uses is free and (relatively) open: the Internet. We advise that for providing information to parents, content providers should put their information online and use SEO and advertising to elevate their content when users are searching, rather than lock content away in apps or texting programs that users would have to download or register for. Additionally, program operators and funders who are interested in reaching large numbers of parents could also work with the sites that already have large audiences (usually commercial sites) and leverage content partnerships with high-quality early childhood content producers to bring evidence-based content to a wide audience. Crucially, funding the creation of content is not enough. We also need to think about funding the marketing and dissemination of content. Paid online advertising campaigns and social media advertising are proven tactics that for-profit content providers use all the time. If we want high quality and evidence-based early childhood content to have a fighting chance of standing out in the sea of information that is the Internet, we need to enable content providers to advertise. There are a multitude of media buying agencies and online advertising agencies that can provide guidance on advertising campaigns and SEO tactics for content producers that do not have that expertise in-house.

These are only a few examples of how smart tactics, creativity, and research can turn insight into impact and help us realize the potential of technology to support the healthy development of children 0–3 and their families. We are moving in the right direction. Our hope is that the recommendations in this report will spur further thinking and build on the momentum we as a field (including the parents we serve) have created so far.

VII. ACKNOWLEDGMENTS

The Early Learning Lab would like to thank everyone who contributed to "NextGen Technology" through conversations, feedback, and advice, including Sunita Mohanty, who helped with the early design of the research study; Aaron Price of the Glen Price Group, who developed the interactive map of technology products; Steven Dow, Kara Dukakis, Lance Fors, Matt Glickman, Lisa Guernsey, Michael Levine, and Ralph Smith, who served on the advisory committee for this project; Zaid Hassan, Cari Caldwell, and Nathan Heinz from Roller Strategies, who trained us on dialogue interview techniques, and Vidya Sundaram, who assisted with the interviews; and Ashley Beckner, Jonathan Goldfinger, Isabelle Hau, Carly Roberts, and Bernadette Sangalang, who provided additional feedback and advice on the work. We would also like to especially thank the Pritzker Children's Initiative, which funded this research and report.

- ¹ For example, see Tap, Click, Read and the OPRE report "Uses of Technology to Support Early Childhood Practice." There are also upcoming reports from Common Sense Media and the Silicon Valley Community Foundation on the responses to early learning technology use by children from parents and teachers.
- ² Please note, we looked for published evidence of impact through the product websites, as we were unable to contact each developer individually. Studies that are in progress were not listed.
- ³ Pew Research Center Mobile Fact Sheet: "Who Owns Cell Phones and Smartphones" http://www.pewinternet.org/fact-sheet/mobile/.

REFERENCES

Brown, C.H. (2014). The Strengthening Families Approach and Protective Factors Framework: Branching out and Reaching Deeper. Center for the Study of Social Policy. http://www.cssp.org/reform/strengtheningfamilies/2014/The-Strengthening-Families-Approach-and-Protective-Factors-Framework_Branching-Out-and-Reaching-Deeper.pdf

Committee on Supporting the Parents of Young Children; Board on Children, Youth, and Families; Division of Behavioral and Social Sciences and Education; National Academies of Sciences, Engineering, and Medicine . (2016). Parenting Matters: Supporting Parents of Children 0-8. Washington D.C.: The National Academies Press.

Guernsey, L., & Levine, M.H. (2017). How to Bring Early Learning and Family Engagement into the Digital Age: An Action Agenda for City and Community Leaders. New America. http://www.joanganzcooneycenter.org/wp-content/uploads/2017/04/digital_age.pdf

Guernsey, L., & Levine, M. H. (2015). Tap, click, read: growing readers in a world of screens. San Francisco, CA: Jossey-Bass.

Hernandez, M.W., Estrera, E., Markovitz, C.E., Muyskens, P., Bartley, G., Bollman, K., Kelly, G. & Silberglitt, B. (2015). "Uses of technology to support early childhood practice." OPRE Report 2015- 38, Washington, DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services.

Hernandez, M.W., & True, S. (2016) Oakland ECE Household Interview Results. NORC at University of Chicago. http:// krfoundation.org/krf/site-content/uploads/2016/05/HHS-Presentation-5-18-Final_saved-on-May-25.pdf

Moore, K.A., Bethel, C.D., Murphey, D., Martin, M.C., & Beltz, M. (2017). Flourishing from the Start: What Is It and How Can it Be Measured? Child Trends 16. https://childtrends-ciw49tixgw5lbab.stackpathdns.com/wp-content/uploads/2017/03/2017-16FlourishingFromTheStart-1.pdf

Rodgers, E. M. (2003). Diffusion of innovations: 5th ed. New York: Free Press.

Rood, E., Hadani, H., Liberman, B. & Whiteside, A. (2016). Reimagining School Readiness: A Position Paper with Key Findings. Center for Childhood Creativity. http://centerforchildhoodcreativity.org/wp-content/uploads/sites/2/2016/03/ SchoolReadinessPositionPaper_Issuu.pdf

Shonkoff, J.P. (2013). Strengthening Adult Capacities to Improve Child Outcomes: A New Strategy for Reducing Intergenerational Poverty. Spotlight on Poverty and Opportunity. https://spotlightonpoverty.org/spotlight-exclusives/ strengthening-adult-capacities-to-improve-child-outcomes-a-new-strategy-for-reducing-intergenerational-poverty/

Tuning In: Parents of Young Children Tell Us What They Think, Know and Need. (2016). Zero to Three. https://www. zerotothree.org/resources/series/tuning-in-parents-of-young-children-tell-us-what-they-think-know-and-need