Researchers use mobile tech, forge partnerships to study home literacy efforts

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Penn State researchers are working with The Shadow Project to analyze possible challenges that parents may face in trying to create a positive home literacy environment. The Shadow Project is a nonprofit organization that supports families by providing parents, special education teachers and children with supplementary programs, services and materials. Credit: Shadow Project

Penn State scientists are combining their skills in data science and innovative approaches to mobile technology with their ability to forge community partnerships to find ways to support families in their home literacy efforts.

The research team is currently partnering with The Shadow Project on a study to analyze possible challenges that parents may face in trying to create a positive home-literacy environment. The Shadow Project is a 501c3 nonprofit organization that supports children with special needs by providing parents, special education teachers and children with supplementary programs, services and materials.

According to the researchers, children who grow up in households with a positive home literacy environment, where books are available and who have parents who encourage reading, tend to develop advanced thinking skills that increase their chances of academic success. However, because it is difficult to collect data over long periods of time in homes, researchers often lack specific data on just how day-to-day fluctuations in parental and household characteristics impact home literacy environments.

While ensuring access to reading material in the home is important, other important resources, such as a parent's time and energy, are often overlooked. Researchers, therefore, need access to a much deeper level of detail on parents' economic, emotional and physical states to better inform literacy programs and interventions.

Wearable electronic devices and apps may serve as an ideal tool for researchers to collect information in just such difficult-to-study environments and to gather data to understand those overlooked needs of parents, which can vary widely from household to household, said Timothy R. Brick, associate professor of human development and family studies and Institute for Computational and Data Sciences co-hire, Penn

State.

"Not every parent is the same and not every parent has the same needs," said Brick. "There are a lot of interventions out there that encourage parents to read with their children. But if we understand what things influence parents' reading practices with their children, we might be able to improve some of these approaches. For example, we find that the amount of time parents feel they have influences how much time they spend with their kids in literacy activities, we might need to consider ways to support parents with time management."

Specifically, parents will use the Wear-IT app, developed by Brick's Real Time Science Laboratory, to more easily record their habits, emotions and reading activities throughout the day. This will also help researchers more easily gather and analyze this important information.

Wear-IT is a scientific data collection app that uses wearable devices, such as smartphones, Fitbits or Apple watches, according to Kyle Husmann, doctoral student in human development and family studies, who is working with Brick on the project.

The system allows researchers to collect information while people are going about their everyday lives. Gathering data in everyday places and at normal times—which scientists refer to as ecologically valid environments—offers researchers the ability to collect information in real time, while avoiding drawbacks of laboratory-based studies, which can be uncomfortable for study participants and possibly affect their participation in studies. For scientists, these issues can lead to outcomes that do not reflect real-world conditions.

Husmann said the researchers plan to ask the parents questions about which factors seem to help, or hinder, their ability to influence kids' reading habits. Some of these questions are better suited to being

answered by parents at home and in the moment, he added.

"We're asking the parents about aspects of the home literacy activities, activities that they were engaging in with their child during the day, whether that's reading with their child or listening to an audiobook or anything that's related to literacy," said Husmann. "But, we are also asking parents how they feel in terms of their confidence in their parenting, and if they feel they're doing a good job and feel like they have the competence to be able to handle helping their kids with reading. And then we're also asking if the parent had enough time and if they felt burdened by finances, or if they feel they have the basic necessities in life."

By collecting and analyzing more information in realistic conditions and ways, Brick said the ultimate aim is to design interventions that help parents.

"It's really important to be able to go in and try to understand on a day-to-day level, for an individual, what are the causes and determinants of these activities, rather than just looking at a single snapshot," said Brick. "And the reason why that's so important, is that ultimately, what we're trying to do is to design interventions that can provide the support that each individual parent actually needs, and to help make positive change in people's lives."

The Shadow Project

The team recruited 15 parents of children with special needs from the Shadow Project's network of approximately 30 K-8 public schools. The Shadow Project was an ideal collaborator for this project because of their unique position as a community resource that supports both parents and teachers. Sharon Juenemann, executive director of The Shadow Project, expressed that their partnership with Penn State on this study

would provide important information to help them better support parents.

"Parents have always been critical advocates for the learning needs of their children in special education," said Juenemann. "And in the past year, remote learning has thrust many families into the role of teacher, like they've never experienced before. I'm thrilled to partner with Penn State on this study to understand what caregivers' experiences have been like, so Shadow Project programs remain centered on what children and families in our community are experiencing on a day to day basis."

Husmann added, "In this particular study that we're doing with the Shadow Project, we're looking at home literacy activities and how they relate to parents' sense of self efficacy and the available resources that are at their disposal."

The parents will be able to answer the researchers' questions when it's convenient, which is a critical piece of collecting information that is complete, valid and reliable.

"It's ironic to ask a parent about the time resources they have to spend reading with their kids by asking them to fill out a long paper survey," said Brick. "The key is, for us, to design the study so we can minimize the amount of burden that it puts on the participants."

Kathryn Stevenson, a private educational research consultant and member of The Shadow Project's community advisory board, assisted the research team in adapting existing measures of home literacy environment, parental self efficacy, and parental resources into brief, low-burden surveys that could be completed on a daily basis through the Wear-IT mobile app.

"This study is especially exciting because it allows us to capture parents'

'good days' and 'bad days," and better quantify what factors are associated with each," said Stevenson. "Parents can experience a lot of ups and downs in the normal course of life, and their feelings and experience changes from day to day and week to week. Simply asking a parent 'what's going on' or 'how are you doing' on one occasion doesn't always give you a clear picture as to what parents are experiencing or what they need. By contrast, following parents across time can help us gain a more complete understanding. Wear-IT helps us do this in a convenient way that does not overwhelm parents. This research can guide the design of programs and resources that support parents by making their 'good days' better or more frequent, or reducing the frequency or impact of bad days."

Wear-IT and beyond

The researchers are eager to explore the possibilities of mobile technology to not just collect data in hard-to-monitor spaces and times, but also to one day set up two-way interactive treatments and interventions. Brick said that, for example, parents could receive immediate feedback on the literacy efforts in the home—and even receiving individualized feedback.

"When scientists offer an intervention to a bunch of people, the average effect of that intervention is that it's making a positive influence in people's lives, but that doesn't mean that everyone is necessarily receiving a benefit from that particular intervention," said Brick. "I think anyone with a child recognizes like, "Hey, you know, some things work for my child, and some things don't work for my child." This type of research allows us to ask, "Why is this intervention—or why isn't this intervention—working for this particular person?'"

Wear-IT is also being used to study a range of other research questions and to develop new interventions on topics ranging from sleep health to

addiction recovery.

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